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This preliminary essay was designed to raise issues for discussion in the International Workshop on Occupational Education and Training for Development held at Stanford University, August 1967, and participants were asked to test and challenge all propositions. The essay offers a conceptual framework and a rational procedure for the planning of occupational education and training in relation to the needs of economic, political, and social development, and gives attention to the following topics: (1) new concepts that appear to be promising and to challenge some old concepts, (2) emerging "best practices," with respect to such things as ways of determining the content of occupational education and training, relations between general and occupational education, respective responsibilities of schools and employers, and provision for feedback between the employment system and the education system, and (3) unsettled issues, key problems and opportunities, and important directions for research and development. While conceived primarily to help development planners in the newly modernizing countries, the essay deals for the most part with principles thought to have wide applicability at nearly all levels of development. (CH)

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PLANNING OCCUPATIONAL EDUCATION AND TRAINING FOR DEVELOPMENT

by Eugene Staley

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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by Eugene Staley

A preliminary essay designed to raise issues
for discussion in the international workshop on
"Occupational Education and Training for Development"
to be held at Stanford University July 24-August 4, 1967

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PLANNING OCCUPATIONAL EDUCATION AND TRAINING FOR DEVELOPMENT

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PLANNING OCCUPATIONAL EDUCATION AND TRAINING FOR DEVELOPMENT

PREFACE

The purpose of this essay is to offer a conceptual framework and a rational procedure for the planning of occupational education and training in relation to the needs of economic, political, and social development. It will give attention to:

- new concepts that appear to be promising, and challenge some old concepts
- emerging "best practices," with respect to such things as ways of determining the content of occupational education and training, relations between general and occupational education, respective responsibilities of schools and employers, and provision for feedback between the employment system and the education system
- unsettled issues, key problems and opportunities, and important directions for research and development.

While conceived primarily to help development planners in the newly modernizing countries, the essay deals for the most part with principles thought to have wide applicability at nearly all levels of development. Experiences and research results from highly developed as well as newly developing countries are drawn upon when they are likely to illuminate the problems of the latter.

This is a preliminary version, prepared for use as a background paper in the international workshop on "Occupational Education and Training for Development" at Stanford University in the summer of 1967. Criticisms and suggestions will be appreciated. At a later date, an amended and perhaps somewhat amplified version may be published. Workshop participants are asked to regard every statement in the paper as an hypothesis and every policy suggestion as tentative. Please imagine that each point is followed by a query: "Is this true (or is the contrary evidence strong?), relevant (or not?), important (or trivial?), feasible (or visionary?). It seemed best to take positive positions in the paper and evoke challenges in the discussion.

Substantial portions of the analysis were developed originally in a paper prepared at the request of the United Nations Centre for Industrial Development (since become UNIDO, the United Nations Industrial Development Organization). It was designed as part of the preparation for UNIDO's 1967 world symposium on industrialization. Permission to adapt and use that material is gratefully acknowledged.

Part of the research reported herein was performed pursuant to a contract with the United States Department of Health, Education, and Welfare, Office of Education. Under the same contract, SIDEC intends to carry on other studies relating to occupational education and training, as one important aspect of a research program concerned with optimal content and methods of education for development.

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March 1, 1967

Chapter 1

INTRODUCTION AND OVERVIEW

"Occupational education and training" means in this discussion all activities in schools or in employment or elsewhere which are either deliberately designed to prepare persons to perform well in occupational roles or do in fact do so. These occupational roles can be in industry, agriculture, commerce, government and politics, health services, education and research, journalism and other social communication activities, or household activities, including those of women occupied in homemaking.

Occupational education and training "for development" signifies that the focus will be on occupational preparation as related to the attainment of economic, political, and social goals. Attention is deliberately not confined to the economic. This is one of the ways in which the present approach departs somewhat, at least in emphasis, from that of a number of other discussions on occupational manpower problems in developing countries.

While the author is an economist by profession, as a development economist he has learned that development does not take place in compartments. The economic, political, and social aspects of things do not exist separately in the real world; they are mental structures in our heads, very convenient for facilitating division of labor and getting ahead with certain kinds of analysis, but also capable of disguising important interrelations that may be the essence of certain kinds of problems. The planning of education with a view to facilitating progress toward developmental goals is one such problem. Through collaboration in SIDEC with faculty colleagues and students from backgrounds of political science, cultural anthropology, and professional education I have been impressed with the interrelatedness of different aspects of developmental goals and of educational measures suited to them.

When allusion is made to developmental goals in this essay, the meaning is goals set by a society for itself, implicitly or explicitly (as in a development plan). In today's newly developing countries the goals differ, of course, from country to country and also from time to time. But there are some common characteristics and some widely shared goals. In their economic aspects, developmental goals generally call for increasing total and per capita output and income through adoption of more modern methods of production, and often there is emphasis on more equitable distribution of the product and on providing more employment opportunities. Goals of political development often include such things as solid establishment of independence, more effective and responsible participation by wider segments of the population in political processes, increased governmental capability to cope with all kinds of problems as they arise, effective direction and administration of the country's developmental efforts, and

--though interpreted differently in different countries--enhancement of human dignity and personal freedoms. Among widely shared developmental goals usually referred to as social are such things as improvements in health, increased educational opportunities and better quality of education, improvements in family life and in the wellbeing and upbringing of children, reduction of birth rates to correspond with reduced death rates and thus to control the population explosion, and lessening of social delinquencies, inter-group tensions, and frustrations among young people and others.

Education and Preparation for Jobs

The purposes of education are multiple. Only one of them is to prepare people for occupational roles. The fact that this essay deals mainly with that purpose by no means implies that other purposes are unimportant. On the contrary, it is desirable to be quite clear that education should seek to promote many aspects of personal self-fulfillment and a wide variety of social objectives, not merely preparation for jobs.

In truth, an education directed too narrowly towards occupational ends might not even be good occupational education. Conversely, good occupational education will also assist in the attainment of the broader personal and social goals of education.

The time-honored and most universal aim of education is what the anthropologists have taught us to call enculturation: fitting people to take part and to contribute satisfactorily in all kinds of interpersonal and institutional relationships required by their culture. Obviously, an important aspect of enculturation is preparation for doing a job that is both socially useful and a means of earning a living.

But the developmental aims of education are getting increased attention today. In the newly modernizing nations, especially, education is being viewed as a powerful instrument for advancing towards goals that require of education, not the mere transmission to this generation of the heritage from past generations, but radical new departures. In some cases, notably in many African countries, the break with the past is very sharp indeed, as leaders endeavor to construct modern economies, polities, and social systems. In the newly developing countries of Asia and Latin American the suddenness of the transition from pre-modern to modern is, by comparison with Africa, somewhat less. But everywhere in the "underdeveloped" world there are enormous gaps between the outlook, knowledge, and skills of the modern-minded people, mostly in the cities, who have absorbed important parts of today's world culture, and the great majority of the population who are still rural and generally much more tradition-minded.

What are the most significant developmental tasks of education in these countries (besides the recurring and also changing tasks of enculturation)? In the broadest and most fundamental terms they are to help both young people and adults to acquire the knowledge, the skills, and the attitudes and values which will enable them to initiate, accept, and adjust constructively to the changes which are both conditions and consequences of modernization. Properly planned occupational education and training is one of the most important approaches to these developmental tasks. For the prospects of attaining desired economic, political, and social goals will be dim until the country concerned is able to produce appropriately qualified personnel to man the many new occupational roles that are essential in a modernizing society.

(In a later revision it is intended to add at this point some further introductory material, including a summary of the main themes to be developed.)

Chapter 2

ANALYZING THE NEEDS FOR OCCUPATIONAL EDUCATION AND TRAINING

Common errors in planning occupational education and training are (1) failure to appreciate the full scope of the problem, and (2) attacking it in a piecemeal fashion. The result may be ill-considered priorities and serious omissions. For example, in order to meet the needs of industrialization, or to help unemployed youths find jobs, or for both reasons, someone decides there should be more vocational schools. But a need which perhaps deserves higher priority may go unperceived, such as management training for local entrepreneurs, who might then be more effective in training their own workforces and in expanding employment.

This chapter will propose an integrated approach to the planning of occupational education and training. Such an approach begins by surveying the whole array of the country's activities that, in the light of development plans and objectives, will require qualified personnel.* The survey should raise questions about relative priorities. The needs of each sector and subsector are analyzed into categories and subcategories suitable to the sector's activities -- first in rather large groupings, later in as much detail as feasible. The analysis should be not only quantitative but also qualitative.

In fact, an important difference between the planning procedure advocated here and that usually followed in "manpower planning" is that we shall be much more concerned with the qualitative aspects. We want to know how to plan the content of education and training as well as the amount of different levels and types of education that will be needed. This requires information about the kinds of skills, knowledge, and personality traits that are either essential or desirable for good performance in different occupational roles.

ACTIVITIES REQUIRING QUALIFIED PERSONNEL

To gain perspective on the whole range of tasks that an ideally perfect system of occupational education and training would have to confront, it may be worthwhile to experiment briefly with a classification of all the activities that, in a modern or modernizing economic-political-social system, require qualified personnel.

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* "Qualified personnel" throughout this study means persons who have an appropriate combination of education, training, and experience.

An activities grouping found useful by analysts of economic development is as follows: industry, defined to include manufacturing, mining, construction, transportation, communications, power and light utilities; agriculture, together with fishing, forestry, hunting and trapping; and services, including wholesale and retail trade, banking and insurance, real estate, various personal, business, and professional services, domestic services, and government. These are the three major sectors distinguished by Simon Kuznets in his empirical study of modern economic growth (1966, Ch. 3). His work shows that generally the industry sector grows most rapidly and therefore increases its relative share in total product and total labor force. Agriculture grows least rapidly, and its share both in total product and total labor force declines. The trends in the share of the services sector are, with respect to total product, neither marked nor consistent among countries; with respect to total labor force, the trend is constant or changes relatively little in several countries, but in a greater number of others there is a large absolute and relative rise.

For our purposes, it is desirable to give equal emphasis to personnel needs for political and social development, not merely economic development, so this breakdown requires substantial modification. Such a modification is attempted in the outline below.

MAJOR GROUPS OF ACTIVITIES REQUIRING QUALIFIED PERSONNEL

I. INDUSTRIAL ACTIVITIES

Manufacturing, mining, construction, transportation, physical communications, power and light, water and drainage systems, installation-maintenance-repair of durable goods, industrial consulting services.

II. AGRICULTURAL ACTIVITIES

Also fishing, forestry, hunting and trapping. Agricultural supply services such as seed, fertilizer, and implement stores. Agricultural extension services.

III. SERVICES

III-1. COMMERCIAL ACTIVITIES

Wholesale and retail trade, finance, real estate services, business consulting services.

III-2. GOVERNMENTAL, POLITICAL, LEGAL ACTIVITIES

Public administration, military and police services, legislative and judicial functions, political party leadership, management and running of political parties and associations having political purposes, legal services.

III-3. HEALTH ACTIVITIES

Activities of physicians, surgeons, dentists, public health officers and their supporting technicians, nurses, office assistants. Activities of hospital administrators, other hospital personnel, pharmacists.

III-4. EDUCATIONAL ACTIVITIES

Public or private schools (primary, secondary, tertiary, adult, special-purpose). Extra-school education overlapping with activities in industry, agriculture, health, and households, also aspects of rural and urban community development.

III-5. RESEARCH ACTIVITIES

Basic and applied research, in special institutions or overlapping with activities in educational institutions, industry, and government.

III-6. SOCIAL COMMUNICATION ACTIVITIES

Newspapers, magazines, broadcasting by radio and TV, running of trade unions, employers' associations, trade associations, professional associations, and many other nongovernmental groups.

III-7. HOUSEHOLD ACTIVITIES

Homemaking, parenthood, and child upbringing. Domestic service.

Here the services sector has been drastically re-divided into seven subgroups, each thought to represent a cluster of activities having some common elements that should be reflected in the qualifications of the persons engaged in them. Installation-maintenance-repair of durable goods has been included under industrial activities. While this overlaps with commercial activities, since installation, maintenance, and repair are often carried on as an adjunct to retail selling, the personnel involved must share some of the qualifications of various kinds of industrial personnel. Much the same comment applies to industrial consulting services, also placed under the industry heading. Similarly, under agricultural activities we include agricultural extension work, which overlaps with government and education, also merchandising of distinctively agricultural supplies like feeds, fertilizers, and agricultural implements, and operation of first-stage processing units and storage and marketing facilities closely bound to agriculture. Again, the reason is the need in these activities for some of the skills, knowledge, and personality traits associated with agriculture.

Two further points about these groups of activities should be noted.

In the first place, groups I, II, and III-1 (industrial, agricultural, and commercial activities) might be said to relate primarily to economic development, though of course they have important implications for social and political development as well. Group III-2 (governmental, political, legal activities) is no doubt the crucial one for political development. Government, of course, influences practically all the other activities in one way or another and is influenced by them. The remaining groups under services (health, education, research, social communication activities, household activities) are especially related to social development but affect economic and political development as well. They are, in fact, the activities most directly concerned with the development of human resources. Hence, they are extremely important as instruments or obstacles in improving the quality of the most important element in development.

In the second place, it is worthwhile to examine the classification from the viewpoint of the kinds of technology most characteristic of each group of activities. We shall here distinguish physical technology, biological technology, and social technology. Physical technology is what is often called simply "technology." It is systematic knowledge of how to make use of physical materials and principles, as in the work of craftsmen or engineers who know how to install an airconditioning system, design an irrigation system, or run a chemical plant. Biological technology, of course, deals with plants, animals, and humans and is illustrated in the work of agriculturalists and physicians. Social technology makes use of economic-social-political-psychological knowledge and principles of action for practical purposes, as in the work of managers, public administrators, politicians, and educators.

Industrial activities are largely built on physical technology, though biological technology is the foundation of some industries, as in pharmaceuticals. But the organizational, managerial, and human relations problems of industry all require some type --good or bad, skillfully or unskillfully applied-- of social technology. If one could make a careful analysis of the number of man hours spent in industry performing tasks that relate mainly to organizational, institutional, and interpersonal relations (hiring people, supervising them, selling, relations with government, etc.) as compared with the hours spent on purely physical operations (machining metal, watching gauges, painting, etc.) the result might change some concepts about the most widely needed qualifications in industry. Almost certainly, activities embodying social technology would dominate among personnel at the higher levels. This might even be true in jobs filled by persons trained in physical technology, such as supervising engineers. Among the top leadership jobs in industry, where the crucial decisions involve goal-setting and value judgments, the most important qualifications may not be so much technological (even including social technology) as humanistic or philosophical. The same is true, of course, in government, in education, and in most other realms important in development.

In agriculture, of course, biological technology is the foundation. Farmers and farm advisers are better qualified when they have a good understanding of how things grow --that is, a grounding in the biological sciences. But agriculture also involves much physical technology, in the form of water systems, use and maintenance of tools and equipment, transport and construction. Finally, the experts on agricultural education point out that the successful farmer must above all be a good manager. He must make decisions not only about soil, water, plants, and animals, but also about when and where to buy and sell, how to adjust his production plans to anticipated market prices, when to borrow and not to borrow, and so on. As agriculture shifts from traditional subsistence farming to more specialized and market-oriented production, the farmer needs a more sophisticated understanding of economic, social, and political factors in his environment and how to cope with them --that is, elementary social science and practical social technology.

As for the activity groupings under "services," nearly all rest more heavily on social technology than on physical or biological technology. One exception is health activities, which are based on biological technology but have a strong component of social technique, especially in public health work but also in medical practice and hospital administration. A partial exception is research activities when directed towards physical and biological problems, though again social technology is a large component in research administration.

PROJECTING QUANTITATIVE REQUIREMENTS FOR QUALIFIED PERSONNEL

The sum total of occupational roles in a country will be referred to as "the employment system." Employment in this context embraces self-employment and the activities of persons employed outside the market economy, such as housewives.

Every occupation in the employment system needs qualified personnel in some sense or other, if only that ability to read or to understand single instructions in the spoken language or a certain amount of experience are wanted. One of the tasks in planning occupational education and training for development is to estimate where in the employment system the provision of more personnel or better qualified personnel will yield the most substantial benefits in relation to the costs --benefits being estimated in terms of the anticipated contribution to the development objectives of the country and costs in terms of the scarce resources, particularly personnel and funds, that have to be used.

A very helpful foundation for such judgments can be provided by manpower requirements projections, which are best when constructed in close relation to realistic development plans and anticipations. Techniques for making quantitative surveys to determine the present utilization of qualified personnel and techniques for projecting future requirements have been developed in recent years and are now widely practiced. The best guide to these techniques and their application in educational planning is a small volume prepared for OECD's Mediterranean Regional Project by Herbert S. Parnes: Forecasting Educational Needs for Economic and Social Development (Parnes 1962). It outlines methods for estimating future manpower requirements in terms of occupational categories and then for converting the occupational requirements into requirements for levels and types of education.

Since these procedures are well described by Parnes and adequately exemplified in a considerable number of studies, they need not be dealt with in detail here.

Limitations on Projections

However, certain limitations on quantitative forecasting of manpower requirements should be noted, for they affect the design of an occupational education and training system. All such forecasts, especially in countries where a drastic break with the past is under way, are bound to be imperfect. Also, it is usually not feasible to cover in specific detail all the many types and subtypes of specialized occupations for which qualified personnel will be needed as development goes forward. Nor is it usually possible to take adequately into account the many transfers of personnel between occupations, the continual ups and downs of demand for various kinds of skills occasioned by technological changes, shifts of demand for various products, new directions in the government's development policy, and so on.

These considerations have three very important policy implications:

First, there should be quick and continual feedback from the employment system to the occupational education and training system, so that wrong anticipations about the required numbers for various occupations and about the kinds of preparation really needed can be quickly discovered and corrected.

Second, a major consideration in occupational education and training policy should be to produce reasonably versatile persons, who can learn new skills quickly and be able to transfer, with some retraining, from one specific job to another within a fairly broad range, as social needs and individual opportunities change.

Third, occupational education and training programs should provide not only for initial preparation of persons to meet present job requirements but, equally important, for continual opportunities of retraining and further education throughout a working lifetime, so as to facilitate mobility within and between occupations.

Classifying Occupations

As reported in the Parnes-OECD volume, the Mediterranean Regional Project developed an occupational classification scheme which is an adaptation of the International Standard Classification of Occupations (found in I.L.O. 1958). The project leaders agreed that:

(a) Manpower analysis for purposes of educational planning requires an occupational classification system that is, as far as possible, convertible into corresponding categories of educational qualification.

(b) The most useful occupational classification system for the Mediterranean Regional Project would be an adaptation of the International Standard Classification of Occupations, since this has been designed to accommodate the occupational structures of diverse economies at varying stages of economic development. Moreover, since it includes detailed occupational definitions, it allows occupations to be classified on the basis of their actual functional content, thus minimizing the difficulties that arise out of differences in the meanings of national occupational titles.

(c) The classification system used in the project should be more detailed at the higher than at the lower occupational levels. The former include the occupations for which training time is generally long, and among which education and training are less transferable than among those lower in the occupational structure.

(d) As a minimum, the amount of detail in the classification system should be such as to permit differentiation between those occupations that require "technical" and those that require "liberal" education. Without such differentiation, useful estimates of teacher requirements and of educational costs cannot be made, for it is considerably more expensive to train a technologist than, say, a social scientist. In those countries whose data permit it, it would be desirable to have more detailed breakdowns than the foregoing, differentiating, for example, between engineers and scientists.

(e) The occupations listed in the International Standard Classification of Occupations should be fitted into four broad classes:

Class A: All occupations for which a university education or an advanced teachers' college degree, or its equivalent, would normally be required.

Class B: Occupations for which two or three years of education beyond the secondary level (12 years) may be required.

> Class C: Occupations for which a secondary school education (either technical or academic), or its equivalent, would normally be required.
>
> Class D: All occupations not included in Class A, B, or C . . . .

These are excellent principles, but two improvements might be suggested.

In the first place, the International Standard Classification of Occupations needs some further development to serve adequately for political and social occupations. It reflects, for example, the conventional error of economists concerned with market values by leaving the (unpaid) occupation of housewife and homemaker out of the picture (though housekeepers and maids are included). Better qualified homemakers, however, may be quite strategic in development. Their role will enter our discussion again in connection with the relation of child nutrition and parental knowledge and attitudes to intelligence level, achievement motivation, and other personality traits in the rising generation. Also, the ISCO deals less than adequately with sub-occupations required for effective development of a modern polity (party officials, legislators, administrative sub-occupations, etc.) and of modern social services. The many sub-occupations involved in health services and educational services receive much less meticulous classification than those concerned with the building and operation of various kinds of machines.

In the second place, and more important, the OECD's differentiation among occupations according to requirements for "technical" or "liberal" education (see paragraph (d) in the quoted material) and its implicit definition of "scientific" and "technical" throughout the volume as limited to the natural sciences and their applications leaves much to be desired. In fact, this way of thinking ought to be obsolete. Occupational and educational planning -- including planning for courses of study, teacher requirements, and equipment requirements-- will be better served by a tripartite classification into "physical, biological, social" sciences and technologies.

ANALYSIS OF DESIRED QUALIFICATIONS

In the planning of occupational education and training programs, analyses should be undertaken to determine the desirable qualifications of the groups and subgroups of occupations estimated to be most strategic to the country's development, and detailed analysis should be devoted to as many as feasible of the most important specific occupations. What is required is not a one-time study, but a continual series of studies, to keep abreast of changing requirements of the employment system and to provide rapid feedback to the education and training system. This information about desired qualifications would then serve as a basis for curriculum construction and course planning in educational institutions, also in extra-school education and training programs such as those of employers and trade unions.

The question immediately arises, are "desired qualifications" to be interpreted as (1) those actually observed under present practice, (2) what employers say they would like, or (3) some optimum set by experts, perhaps higher than either of the foregoing? The problem can be illustrated by qualifications of primary school teachers. In some countries the actual qualifications of teachers now on the job are extremely low; sometimes their own formal education hardly extends beyond the primary, if that. It would be self-defeating simply to ascertain the present reality and accept that as a standard. On the other hand, standards that experts would regard as ideal are probably unfeasible for the near future. The best policy in such a situation is usually a combination of (1) preparing new entrants to the occupation to meet target standards considerably above the present reality but probably short of the ideal, and (2) mounting a vigorous in-service program of additional training and education to improve the qualifications of those already active. Then, gradually and progressively, the target standards for "desired qualifications" can be raised.

Skills, Knowledge, and Personality Traits

An analytical framework for analyzing desired qualifications in different occupations or occupational groups is offered below under three main headings: skills, knowledge, and personality traits.

SKILLS

The ability of an individual to perform certain kinds of tasks with more than usual proficiency, as measured by quality of result and economy of effort, is what we mean by skill. There are skills very specific to particular jobs, like the skill of the lens grinder. Others are applicable to a wide range of jobs, as is true of mathematical computation, writing and speaking, or organizing. There are manual skills and mental skills, also skills that combine the two in complex ways, as in the work of a construction foreman or an electronics repairman. Some skills are primarily analytical, such as those used by the chemist in an industrial testing laboratory. Others have a large synthetic or creative element, as in the case of a designer developing a new product, a research scientist building a new theory of fatigue in metals, or an inventor devising a new industrial process and an entrepreneur putting it into practice. There are individual skills and social skills, the first exemplified by the craftsman working alone, the second in the human relations arts used by a manager, a foreman, a trade union leader, or a politician.

Skills can be broken down into their component parts --general skills like reading and writing, computation, etc., and specific skills like the operation of a punch press or how to make a market survey. When this is done systematically and continually, it should be possible to increase the efficiency of education and training programs, by concentrating on those skills that are really crucial and not wasting valuable instructional time on others that are now obsolete or less important.

The following breakdown suggests major types of skills that should be considered when analyzing the education and training needs of specified occupations:

1. Communication skills - speaking, reading, writing (in mother tongue, national language, a world language)

2. Computational skills

3. Mechanical skills

4. Human relations skills

5. Analytic skills - facility in scientific methods of analysis, including mathematics, statistical methods, laboratory techniques, etc.

6. Synthetic skills - creative design, invention

7. Learning skills

8. Skills specific to particular occupations or tasks

KNOWLEDGE

To perform well in a given occupational role a person needs a certain range of factual knowledge (narrow for some, very broad for others) and, more fundamental, a certain range of understanding, which means the way things and events affect each other, acquaintance with concepts and theories that help in discovering cause and effect relations. Knowledge of the concept of microorganisms and their role in the causation of disease enables the public health physician to fight epidemics and the mother to protect her child against infection. Knowledge of the interrelations of savings, investment, and the price level in an economic system helps the economic technologist to plan measures for checking price inflation. Knowledge about the lives of great leaders of the past or familiarity with great literature and drama may provide inspiration and a set of values to a political leader or fire the ambitions of a school child.

It is not easy to decide, and probably impossible to decide with precision and confidence, what kinds of knowledge constitute the minimum essential or the optimum for a specified set of occupations. Broad perspective and unconventional bits of knowledge may make the difference between creative innovation in a job or routine performance. However, it is necessary to make decisions about what things to stress when planning a curriculum of education and training to prepare for a certain kind of occupation. The following framework may be useful as a checklist:

1. General information to live by.

   Loosely structured knowledge, often not systematically or critically examined, about one's own environment and the ways of one's own people, and what results are likely to flow from various kinds of action.

2. Scientific knowledge.

   Understanding of interrelationships (cause and effect), in terms of carefully defined concepts and carefully examined and tested propositions.

   a. Physical (as in physics, chemistry, astronomy)

   b. Biological (as in botany, physiology, bacteriology)

   c. Social (as in economics, cultural anthropology, sociology, political science)

3. Technological knowledge.

   Knowledge about ways of manipulating the physical, biological, or social environment for practical purposes:

   a. Physical (as in civil engineering, electrical engineering, the craftsman's knowledge of materials and tools, etc.)

   b. Biological (as in agriculture and animal husbandry, manufacture of antibiotics, food preservation, etc.)

   c. Social (as in economic development planning, management of a factory, administration of a social service, political leadership, etc.)

4. Humanistic knowledge.

   Appreciative understanding of man's aspirations, strivings, achievements, and failures.

a. History of man's biological and cultural evolution, of science, of recent economic-social-political developments affecting mankind and that segment of mankind closest to home.

b. Creative arts, such as music, literature, painting, sculpture, architecture, the theatre, the dance.

c. Knowledge of the values of mankind portrayed in philosophies, ethics, and religions.

5. Knowledge specific to particular occupations or tasks.

PERSONALITY TRAITS

To denote the dispositions, motivations, attitudes, and values which influence a person's performance in a job we shall use the term "personality traits." It is a common observation that many people who are rather competent in terms of skills and knowledge fall short of what they could accomplish in their occupational roles because they are unable to cooperate well with other people, or lack integrity, or do not have the "achievement motivation" which manifests itself in a striving for excellence, setting progressive but realistic goals, and working hard to attain them. The scientific attitude of honest, careful inquiry and the technological attitude that "there must be a better way" are particularly desirable qualifications for all kinds of leadership roles in development, not only at the top levels but all through the employment system --for example, progressive farmers.

The following is a check list of personality traits which, while probably desirable in any occupation, may have different degrees of importance placed upon them with reference to particular occupations and groups of occupations:

1. Intelligence - adaptability, alertness

2. Achievement motivation

3. Scientific and technological attitudes - inquiring, innovative approach

4. Integrity - honesty, reliability

5. Readiness to cooperate with others

6. Personality factors specific to particular occupations or tasks.

Analysis of Activities Groups: Example, Industry

For each of the major activity groupings outlined earlier, planners of occupational education and training should develop sub-classifications appropriate to their country (drawing on and adapting international experience). For each sub-group, down to as fine detail as seems feasible and necessary in the circumstances, a systematic analysis of desirable qualifications should be made, using as a checklist something like the outline of types of skills, knowledge, and personality traits suggested above.

The beginning of this process is illustrated with reference to one of the major groupings (industrial activities) in the cross-tabulation below (Figure 2-1, page 2-14). Across the top of a worksheet, simulated by Figure 2-1, the various types of skills, knowledge, and personality traits are arrayed. At the left side of the worksheet are placed the occupational categories and subcategories to be analyzed. Then the task of the planner, aided by experts, and where possible by actual field studies or reports of such studies, is to assemble information that will enable him and his co-workers to make valid judgments for each occupational category about the various types of skills, knowledge, and personality traits that are (1) minimum essential and (2) optimal. In terms of the worksheet exemplified in Figure 2-1, this means filling each of the boxes created by the intersections of the vertical columns and the horizontal rows with a well-considered judgment. In practice, of course, such a worksheet would mainly serve the purpose of raising the appropriate questions. The answers, and the evidence on which the answers are based, would no doubt be embodied in many separate reports prepared by, for example, an expert commission on the curriculum for engineering schools, or a study team on teacher education and training, or a workgroup to advise on a program of adult education for parents.

The occupational categories at the side in Figure 2-1 have been devised with particular reference to the needs of the industrial sector. For analyzing other sectors, such as agriculture, education, or government and politics, rather different approaches would be appropriate.

A few comments may be made on the illustrative analysis of major types of qualified personnel needed in industry. At the top of the list in Figure 2-1 comes the innovative organizer or entrepreneur. His is a key function in industrial development, and indeed in many other aspects of development. He brings together new combinations of productive factors, launches new products, cultivates new markets, and introduces new technology (in the physical or biological technology of production and also in social technology, such as methods of organization and management). These innovating and organizing functions have to be performed in government and in public-sector enterprises as well as in private-sector enterprises where the term entrepreneur is generally used. The personnel needs for industrialization start with

Figure 2-1

DESIRED QUALIFICATIONS FOR OCCUPATIONAL CATEGORIES

---- INDUSTRY

	SKILLS								KNOWLEDGE											PERSONALITY TRAITS						
	Communication	Computation	Mechanical	Human relations	Analytical	Synthetic	Learning	Specific to occupation	General	Scientific	a. Physical	b. Biological	c. Social	Technological	a. Physical	b. Biological	c. Social	Humanistic	Specific to occupation	Intelligence	Achievement motivation	Scientific-technological attitude	Innovative	Integrity, honesty, reliability	Readiness to cooperate	Specific to occupation
1. Innovative organizers - entrepreneurs a. Public sector b. Private sector																										
2. Managers a. Top and middle level managers in large organizations b. Managers of independent small enterprises																										
3. Submanagers - supervisors and foremen a. Production and maintenance work b. Office and commercial work																										
4. Professionals a. Technologists - engineers (1) Physical science based (2) Biological science based (3) Social science based b. Research scientists (1) Physical science based (2) Biological science based (3) Social science based																										
5. Subprofessionals - technicians a. Physical science based b. Biological science based c. Social science based																										
6. Broadly-skilled workers - craftsmen a. Production and maintenance work b. Office and commercial work																										
7. Specific-skilled workers - operatives a. Production and maintenance work b. Office and commercial work																										
8. Unskilled workers - but not entirely unqualified																										
9. Special combinations of the foregoing																										

innovative organizers, and this holds regardless of the ideology of a country and the particular mixture of "socialist" and "private enterprise" elements in its economy.

Next to the innovative organizer in strategic importance and, indeed, essential for bringing his initiatives into effect, are suitably qualified managers and submanagers. Innovative organizers, managers, and submanagers, together with some closely associated professionals and subprofessionals, might be called "the organizing factors" in industrialization. They are the leaders in development and those who give concrete shape and execution to ideas that would otherwise remain mere dreams. Without reasonably adequate personnel to perform these functions, industrialization cannot go forward satisfactorily no matter how many skilled workers the education and training system turns out. On the other hand, if there are competent people to handle these organizing functions they will create jobs and they will initiate training programs to overcome shortages that may develop in the supply of other sorts of qualified manpower. For this reason, the occupations we are discussing can be termed "multiplier occupations." The first priority, therefore, in a program of education and training for industrialization should go to preparing and improving the qualifications of persons who will be competent to perform well as innovative organizers (entrepreneurs), managers and submanagers, and in certain closely related professional and subprofessional roles.

Professionals and subprofessionals in technological and research occupations have been sub-classified as "physical science based," "biological science based," or "social science based," according to the educational area of major importance in laying the foundation for their subsequent specific training and work. In the group for which physical sciences would be most important are, of course, the electrical, mechanical, chemical, and other engineers and the researchers in physical sciences and their applications. Needing a strong base in biological sciences are such occupations as those of livestock breeders, agricultural advisers, physicians, nurses, and researchers in related fields. Social science foundations are most appropriate for such social technologists as economic planners, marketing analysts, and designers of education and training programs, together with associated subprofessionals like statistical assistants and interviewers, and also researchers in economics, politics, sociology, and related fields.

Broadly-skilled workers (craftsmen) are those capable of performing well a considerable range of tasks, while specific-skilled workers (operatives) are trained only for one or a few comparatively narrow jobs, like running a certain machine or handling certain types of sales orders.

Drawing on International Experience

This advice to analyze the desired qualifications for the many different types of occupations that are important in development may seem like a counsel of perfection, and in a sense it is. Yet the analysis and rethinking that would be required is likely to prove highly rewarding, and there are a number of considerations that make the undertaking less formidable than might appear at first.

Not everything need be undertaken at once. The most urgent needs are limited in number, and a selective approach is indicated. A start can be made with the occupational groups that are most important developmentally in the country's circumstances, and successive studies on other groups can be done over the years.

Furthermore, there is overlapping and interchangeability in the requirements for different occupations, so that the coverage of the analysis can be multiplied rapidly once a limited number of initial studies have been made.

In this connection, the identification of "clusters" of occupations that share a considerable proportion of their respective desired qualifications may be one of the most helpful results for educational planners concerned with curriculum development.

Finally, large amounts of detailed work relevant to this type of analysis has already been done at various places in the world. The results can often be adapted to local circumstances with much less additional labor than would be required to start from scratch. Educational institutions, various kinds of specialized training schools, and the training officers of employing organizations have been grappling for a long time with the universal problem of what targets to aim at in their instructional programs. Some of the results have been written down in reports or in institutional programs and syllabuses which can be useful in countries faced by similar problems. More, however, is in the minds of a great variety of occupational specialists and educators, available mainly through the use of well-selected consultants. The international aid agencies concerned with human resource development, education, and training for various kinds of developmental activities could perform a useful service by giving more attention to the assembly, analysis, and dissemination of this kind of information. Of course, while drawing on accumulated world experience, national development leaders will need to use care not to accept what is inapplicable and to adapt all findings to the special circumstances prevailing in their countries.

FROM DESIRED QUALIFICATIONS TO EDUCATION AND TRAINING PROGRAMS

Note:

The Workshop will want to consider in this connection some techniques that are now being used in curriculum construction for specific kinds of occupational preparation. Examples will be available in materials such as the following:

Studies by the research staff of SCT (now become INACAP), a Chilean occupational training organization, on the kinds of handtools, mathematical operations, etc. actually used by workers engaged in various skilled trades.

A Study of The Aviation Mechanics Occupation, by David Allen, John M. Meyer, Alvin Gorenbein, and William K. Bowers. A cooperative study between the Division of Vocational Education, University of California, Los Angeles; Bureau of Industrial Education, California State Department of Education; and U.S. Office of Education, 1966, 229 pages.

An Investigation and Development of the Cluster Concept as a Program in Vocational Education at the Secondary School Level. Donald Maley, Principal Investigator, Industrial Education Department, the University of Maryland, 1965-1966. 3 volumes: "Final Report Phase 1," "Course Outline, Electro-Mechanical Installation and Repair Cluster," and "Course Outline, Construction Cluster."

In a future revised version of this essay it is intended to include, with the help of the Workshop discussion, some treatment of techniques like these and their significance.

Also, it is tentatively planned to include at this point a comment on what may be called "the school curriculum and the extra-school curriculum" or "curriculum and super-curriculum," to emphasize that occupational education and training ought to be thought of as a whole, including education, training, and experience provided in educational institutions, in organized training within employment, and in work experience.

Then the question of the feasibility of doing something in occupational education and training programs to influence personality traits will be raised. A tentative draft on this topic follows.

Can Education and Training Shape Personality Traits?

While it is well established by experience in many countries that education and training programs can impart skills and knowledge, one may reasonably question how effective any planned programs can be in shaping personality traits. According to the thinking of current social science, most of these traits are rooted in a combination of inherited capacities and a particular cultural environment, the latter impinging powerfully on the individual in infancy and childhood, especially through the family. By the time the individual comes into a formal education system, and especially when he is old enough for occupational education and training, fundamental personality traits are fairly well set. Nevertheless, there is some plasticity, and some evidence that education and training programs can be devised which have a significant impact on at least some of these traits.

Intelligence, or mental alertness and adaptability, while certainly greatly dependent on heredity, is also subject to environmental influences. Malnutrition, especially in childhood, can have a very unfavorable effect, as can cultural deprivation which prevents a child from being sufficiently exposed to favorable mind-forming experiences. Malnutrition is in some cases due not so much to lack of proper foods or general poverty as to ignorance on the part of the mother, and where this is the case parent education might result in a better-nourished and therefore more alert next generation. Methods of child upbringing might be taught, even to illiterate parents, which could perhaps have favorable effects on the mind-forming of their children. Parent education, nursery schools, and special school programs for disadvantaged children are possible ways to try to counteract cultural deprivation.

Achievement motivation means striving to do well with respect to some standard of excellence, setting standards of performance for oneself, and finding rewards in a sense of having accomplished something. Achievement motivation has been much studied by psychologists in recent years, notably by David C. McClelland of Harvard and his co-workers. (see McClelland 1961, 1966). They have developed ways of measuring it (under the technical name "need for achievement" or "n-ach"), by scoring achievement motifs in fantasies stimulated by pictures or brief descriptions of situations. They have also measured it with respect to past or present societies by scoring folk tales and stories for children.

McClelland has adduced much evidence that societies strongly infused with achievement motivation are likely to have more rapid economic development than societies where the people are less achievement-motivated. The achievement motive, like other personality traits, is strongly conditioned by the upbringing of children --for example, whether the mother expects and encourages the child to be active and energetic, to try hard things for himself, to overcome obstacles, and to do well in competition. In this connection, the relevant education and training programs would seem to be for parents, on how to bring up their children. But some experiments by McClelland and associates also give strong indications that even in adults achievement motivation can be significantly increased. They have used fairly simple and inexpensive conference techniques. (McClelland 1966.) Preliminary results certainly warrant further and more extensive experimentation. It may be that in this area of motivational psychology there are unexploited opportunities for education and training programs that could yield very high benefits.

To what extent can education and training impart a "scientific attitude," meaning a disposition to inquire objectively and systematically into the relations of things in the physical, biological, or social world, to seek verification, and to regard all propositions and doctrines as hypotheses with varying degrees of explanatory value and always subject to modification in the light of new evidence? Available evidence suggests that a very great deal can be accomplished along this line, but that the degree of success depends less on the subject-matter taught than on the manner in which it is taught. The mere teaching of "science" by rote memorization is not likely to produce a scientific attitude. The important thing is that the students be stimulated to ask questions and to seek answers by observation and experiment, learning and using in this connection important theories, observations, and techniques available in the world's vast scientific heritage.

Similar observations apply to the possibility of developing by education and training a "technological attitude" and an innovative disposition --that is, a practical problem-solving approach, an unwillingness to rest content with traditional ways of doing things, a continual search for better ways of attaining desired goals, and a readiness to test out and adopt promising new methods. Again, not merely learning about modern technologies (physical, biological, and social) is important, but the spirit and methods of the teaching and learning.

The situation is analogous with respect to other personality traits that are important in nearly all occupations --readiness to cooperate with others, integrity, honesty, and reliability. Direct teaching about these things may to some extent produce the desired results, but much more influence is likely to come from the examples and precepts of the culture in which the youngster grows up and from opportunities that may be offered in the school setting to practice cooperation with others and to take responsibilities in group projects, school activities, and student self government.

There is some evidence that developmental effects significant for a whole national economy can be attained through educational programs that influence personality traits. The best known case where such results have been claimed is that of the Danish Folk

High Schools. As summarized by P.G.H. Hopkins in a paper on "The Role of Adult Education in Economic Development (in Jackson, ed., 1965):

> "Nobody can estimate exactly what contribution to the Danish economy was made by the Danish Folk High Schools; but all who have studied these adult education colleges and have seen them in action are agreed that they revolutionalized the Danish rural scene. In rapid succession in the mid-nineteenth century Denmark lost land and national prestige in the wars against Prussia and then grain markets and prosperity as the New World prairies were opened up and the Atlantic freight rates were slashed. Yet in this period the Danish residential colleges were started and thrived and the Danish peasant, who had been described as 'unprogressive, sullen, suspicious, averse from experiment and incapable of associated enterprise' became 'forwardlooking, cheerful, scientifically minded, resourceful and cooperative.' A Danish Education Inspector remarked in the early days how quickly the young men and women learned: he was impressed not so much by the knowledge they have acquired as by the fact that 'they leave the schools different people, having learned to hear, to see, to think and use their powers.' These became the young peasant farmers who, within a generation, transformed Danish agriculture into the most efficient butter and bacon producing economy in the world. 'The peasant helped himself. He adapted his methods to the new circumstances . . . He was open to the new ideas and willing to apply them. The mobility, the capacity and the culture that such a radical change calls for, when it is to be made by voluntary effort, the Danish peasantry then possessed; and this fact is certainly due to the influence of the Danish Folk High School.' (Hans Lund.)"

SOME CONCLUSIONS

The analysis of this chapter suggests a number of practical conclusions which will be briefly presented.

1. Occupational education and training programs to foster development should be planned with reference to the priority needs of the employment system, not simply adopted haphazardly and piecemeal.

2. Highest priority should be given to programs which raise the quality and (to the extent necessary) the quantity of qualified personnel required in "multiplier occupations" --for example, innovative organizers (entrepreneurs), managers and submanagers, and selected types of professionals and subprofessionals, including teachers. These are the people who must create new enterprises and new jobs and provide for education and training to meet other personnel needs.

3. In order to obtain a suitably balanced output of persons qualified for different occupational roles, there should be: (a) continuous study of the changing requirements of the developing country, and (b) close linkages between the employment system on the one hand and the education and training system on the other, so that there is immediate feedback to correct errors in forecasts of requirements.

4. In planning the content of education and training that will be best in preparing for different occupational roles, it is useful to think in terms of a matrix or cross-tabluation in the form of Figure 2-1. Analysis of this sort will probably reveal that there are numerous common items of skill, knowledge, and personality traits which are desirable in some degree for practically all occupations. Other requirements are shared by fairly broad groups of occupations. Finally, there are highly specific requirements for particular occupations and even for particular jobs within a given occupation.

5. The foregoing point makes it desirable that an education and training system should be so planned as to impart:

(a) to everybody, as much as possible of the skills, knowledge, and personality traits which are broadly applicable to a wide range of occupations and jobs,

(b) to those looking toward a certain range of occupations, the additional skills, knowledge, and personality traits considered especially important for such occupations,

(c) for those definitely committed to a particular occupation, still more definitely focused preparation, and

(d) finally, at the point of commitment to a specific job, the specific training to meet its special requirements.

6. Because of the rapid changes in occupational requirements induced by progressive technology and by changing economic, political, and social environments, the concept of an "occupation" as a well-defined and stable entity is becoming less applicable. It is therefore important to educate for basic skills, knowledge, and personality traits that are broadly applicable, so as to enable individuals to learn specific jobs quickly and to be in a position to learn new techniques or to shift to new jobs by retraining when necessary. A person who has this basic preparation may still lack the more specific skills required for a particular job. But he is a trainable person.

In the next chapter we shall consider how an occupational education and training system might be designed in order to give effect to these conclusions.

Chapter 3

A GENERAL PLANNING MODEL FOR OCCUPATIONAL EDUCATION AND TRAINING

This chapter puts forward for discussion a basic pattern by which to plan occupational education and training to meet the qualified personnel needs of development.

The suggested pattern departs in some respects from conventional practices. The novel features, however, are not untested: nearly all of them have been tried out here or there around the world and, in my opinion, represent emerging best practices. Perhaps the main departure here is their integration into a combined pattern. This attempt to present a unified concept of what occupational education and training should seek to accomplish in its different phases, how these can be organized and interrelated, and how operational and financial responsibility might be shared between the educational system and the employment system, will, it is hoped, be useful to educational planners and general development planners.

Of course, this is a general pattern or model, not necessarily suited in all respects to any particular country. The basic approach is believed to be widely applicable, but the details of its implementation will, naturally, vary considerably depending on such factors as the level of a country's general development, the nature of its industries, its political and social ideology and organizational style, its existing educational and training institutions and their traditions, and the outlook and administrative capacities of its leaders in the public and private sectors.

A PHASED CONCEPT

It is proposed that plans for occupational education and training recognize the following phases or stages which merge into each other and to some extent overlap. Phases 1 and 2 should normally take place in schools (defining schools to include tertiary as well as primary and secondary levels), Phases 3 and 4 in employment. It is proposed that Phases 1 and 2 be recognized as the responsibility of the educational system and Phases 3 and 4 of the employment system, though the educational system would cooperate and assist substantially in the educational aspects of Phases 3 and 4 and the employment system in pre-occupational aspects of Phases 1 and 2.

Phase 1. General education

Phase 2. General and pre-occupational education

Phase 3. Job-entry training, with further education

Phase 4. Career-long retraining and further education, for advancement, renewal, and transfer

The first two phases are primarily concerned with education, the last two with training, but training should nearly always include some further education. The distinction between education and training is mainly one of degree of specificity. Education is concerned with skills, knowledge, and personality traits broadly relevant for a great many purposes and life situations; training is concerned with skills, knowledge, and personality traits relevant to good performance of a specific task or a set of tasks making up a job or occupation.

This four-phase model has the virtue of simplicity, but it misses some very important realities at the transition between Phases 2 and 3 --that is, from schooling to employment. Many persons, probably most in most countries, go direct into employment from whatever level of general schooling they attain. But many others, among them some who constitute important categories of qualified personnel, go through transitional institutions of one type or another: medical schools, business schools, teacher training schools, law schools, technicians schools, trade schools for craftsmen, supervised apprenticeships, special schools or courses for secretaries, fashion models, hotel personnel, etc., etc. The instruction in these institutions covers a range that sometimes, not always, includes both broad pre-occupational education and specific job training; in other cases the emphasis is towards one end or the other of this spectrum, probably most often the specific training end. In order to emphasize the importance of this transitional stage and of the institutions serving it, an in-between phase must be added to our model:

Phase 2 1/2. Transitional. Occupationally specialized education and training.

It is proposed that this phase should be the joint concern of the educational system and the employment system (along with further education aspects of Phases 3 and 4). An organizational mechanism will be suggested for implementing these joint concerns and also for giving much more importance than is now the case in most countries to Phases 3 and 4.

In fact, educational planners and development planners ought to think in terms of a "second educational system," this one taking up where the regular educational system leaves off, serving (1) young persons entering or about to enter employment and (2) employed persons throughout their working careers, including the self-employed and adults generally.

DESCRIPTION OF THE PHASES

Phase 1. General Education

General education, besides enlarging the individual's horizons and preparing him for life in society and for citizenship, also is a nearly indispensable foundation for all modern-type occupations. It should provide at least elementary skills in communication (reading, writing) and computation, some knowledge of the physical, biological, and social world and of the humanistic heritage, and should contribute to formation of desirable attitudes, motivations, and values. General education, even in the primary school, should include some orientation towards the world of work, not as specific vocational courses but woven into studies about the physical, biological, and social environment. As to the length of this phase, ideally, each person should have the opportunity to absorb as much general education as his aptitudes and interests suggest; in practice, the rule may have to be as much as he and the country can afford.

Phase 2. General and Pre-Occupational Education

The period of general education should conclude with two or three years in which the general content is combined with an increased amount of occupationally-oriented content, somewhat more selective and focused at this stage, and with a really strong effort in the field of career guidance and counseling. The curriculum should provide for "streams" of students tending towards different clusters of occupations (mechanical, commercial, homemaking, scientific, etc.) with some specialized subject matter for each stream and a common core for nearly all students. The occupationally-oriented content should still be quite broad, offering appropriate background for large groups of occupations rather than for very specific occupations or jobs. It should aim to produce trainable rather than fully trained people. It should provide fundamentals that make for versatility and ability to learn and relearn on the job. The fundamental task of the student in school should be viewed as "learning to learn." This phase should be within comprehensive (multi-channel) schools, preferably not in separated schools which isolate students preparing for a higher academic level from vocational preparatory students.

Phase 3. Job-Entry Training, with Further Education

When the individual first enters employment his specific job training should begin. This is the desirable general principle --not very specific training prior to and unconnected with employment in the hope of finding employment, but training upon entry into employment or into at least a tentative employment agreement. However, there are many situations in which this principle cannot be applied, and it has to be interpreted flexibly. Important modifications of it are represented by "Phase 2 1/2," discussed below. The specific job training should, wherever feasible, be conducted by or in close cooperation with the employing organization. In fact, the aim of development planners should be to cause every employing organization --government agencies and private employers-- to function also as a training organization, or to join with others in arranging for and paying for a training program. Job-entry training programs should usually combine three elements: (1) work experience in a production situation, under guidance; (2) specific occupational instruction in classroom, laboratory, or teaching workshop; and (3) further education, a continuation of broader general occupational education, to remedy deficiencies and build further on the individual's existing educational background.

Phase 4. Career-long Retraining and Further Education

Opportunities should be systematically provided for additional training and further education throughout each individual's working career. This is probably the most neglected area in educational planning, and it may be the one where added attention and investment would yield the largest immediate returns. The direct purposes in this phase should be three: (1) advancement of the individual's competence, to do his particular job better or to move to the next higher job, as when an electronics technician by study and experience moves up to be an electronics engineer; (2) renewal of qualifications in a trade or occupation, updating knowledge and skills to keep abreast of technological or other changes, as when a plumber skilled in handling steel pipe learns to handle plastic pipe or a physician learns about new antibiotics; and (3) transfer to a different job or occupation requiring a different set of skills, knowledge, and perhaps even personality traits, as when a coal miner whose job is eliminated by mechanization retrains to be a radio repairman, or a shop worker becomes a salesman, or an engineer becomes a manager or an independent entrepreneur and therefore needs to learn about administration, marketing, and finance.

Phase 2 1/2. Transitional. Occupationally Specialized Education and Training

There are important exceptions to the principle that specific job training is best done at entry into employment and by, or in close cooperation with, the actual or potential employer. They fall into three classes: (1) Desired qualifications are nearly identical and almost immediately transferable among many employing organizations. It would be inefficient for each employing organization to train its own stenographers, for example. The basic training, at least, can better be done in a special school or as an optional course in a general secondary school. However, some job-entry training is still desirable if the functions of the new worker require some understanding of the peculiarities of the employing organization's activities, as they usually do. (2) Where there is self-employment or employment in many small enterprises. This characterizes the employment of many barbers, photographers, lawyers, and numerous other trades and professions. (3) Where occupational preparation requires a long special education, gradually narrowing into specific training. This gives rise to professional schools, like schools of medicine which build from biologically slanted pre-occupational education to basic principles of medicine and finally to specific training "on the job" by supervised interneships in hospitals. Any of these three situations, or a combination of them, may make some type of specialized program desirable, between stages 2 and 3, mediating the transition from general education to specific employment. Part, but by no means all, of the functions of specialized institutions for occupational education and training (trade, technical, and professional schools of all types) should be conceived in this context. These institutions also perform important functions in Phases 3 and 4. Intimate cooperation with employing organizations is important for effective functioning of such institutions in all phases.

ORGANIZATION AND FINANCING

More will be said in subsequent chapters on the educational and occupational reasons behind this phased approach, on its points of difference from conventional approaches, and on key issues that need discussion. Meanwhile, the balance of this chapter will consider ways of implementing the concept.

In designing an occupational education and training system or improvements in an existing one, no country starts with a clean slate. There are going institutions, traditions, practices, and points of view not easily changed, not to speak of constraints imposed by available resources. Since no two situations are exactly alike, it is impossible to propose specific solutions of problems of organization, financing, and methods of work that will be realistic and generally applicable. Each country must work out solutions appropriate to its own situation. What we shall attempt to do here is to offer some ideas and principles that are capable of being adapted in a variety of different ways to fit specific situations.

It is proposed that responsibility (both administrative and financial) for the four phases of occupational education and training be shared by the education system on the one hand and the employment system on the other, as follows:

1. Phases 1 and 2 --that is, general education and pre-occupational education-- should be the responsibility of the regular school authorities (the ministry of education, or whatever the agency or agencies may be called).

2. Phases 3 and 4 in their training aspects --that is, job-entry training and career-long retraining for advancement, renewal, and transfer-- should be the responsibility of the employment system. This responsibility should be organized through a mechanism representing employers (public and private), labor, educators, and government, which we shall call an Occupational Training Organization (OTO). The OTO might take a variety of different forms in different countries. The OTO and its training programs should be supported, at least

partly, by a compulsory levy on employers (whether in the private or public sector). In order to encourage employing organizations themselves to undertake training, the OTO should offer rebates of the levy equal to amounts spent on training programs, provided the programs meet minimum standards verified by inspection.

3. Phases 3 and 4 in their further education aspects should be the responsibility of the school authorities, but in close cooperation with the training programs of the employment system. This cooperation would be organized and facilitated by the OTO, on which both systems would be represented. The cooperation should also extend to the occupational counseling and guidance aspects of Phase 2.

4. The transitional institutions and programs linking Phases 2 and 3 (Phase 2 1/2 as we have dubbed it) should be a shared concern of the school system and the employment system, the responsibilities and contributions of each to be worked out through an OTO, where both are represented.

5. The OTO should function as a link between the educational system and the employment system, combining the interests and expertise of both in planning and coordinating a comprehensive program of occupational education and training geared to the country's development objectives.

The next chapter will say more about the functions of an occupational training organization and the various alternative methods by which it might be organized and financed.

Chapter 4

AN OCCUPATIONAL TRAINING ORGANIZATION

The proposed OTO could take any of several different forms, depending on institutions and preferred methods of work in the country concerned. Examples of different ways of organizing will be referred to later. Probably most generally recommendable, if in line with a country's institutional and legal habits, is some form of public or quasi-public corporation with a governing body representing:

1. The employment system

    Employers --private sector and public sector
    Workers --labor unions

2. Government

    Labor ministry
    Education ministry
    Perhaps other ministries or agencies concerned with manpower, planning, economic affairs, industry, commerce, or agriculture

3. Educational and training institutions

    Representatives of selected schools or training centers or productivity centers actively engaged in work related to the OTO's functions

Depending on the size of the country and the size and diversity of its economy, it might be desirable for the OTO to have a substructure consisting of regional boards or boards for particular activities (manufacturing, transport, health, construction, agriculture, etc.). In some countries having decentralized federal systems the operational OTO might be a set of provincial or regional or state organizations, with a national organization to perform service functions and promote overall planning, or perhaps no national organization at all. In some countries the OTO might be established within one of the national ministries or as a adjunct of a national manpower board. It is important, however, that it be established in such a way as to encourage real linkage (communication, cooperation) among agencies and institutions concerned with education, occupational training, and employment.

In all cases the OTO will need a strong staff headed by a full time administrator of high competence who must have sufficient prestige to inspire confidence and cooperation in the worlds of industry and commerce, labor, government, and education.

Funds and Incentives

The funds for education --general, pre-occupational, and further education-- should come from the normal sources for educational finance in the country concerned, whatever these may be. In most cases educational funds derive from tax revenues at one or more levels of government.

The costs of training (as distinguished from education) should be borne by the employment system. For the sake of good social cost-accounting and correct signals through the market-price mechanism, there is a strong case for collecting the costs of specific training from the industry or other activity that directly benefits from it, approximately in proportion to the trained manpower that it uses. This can be done by the device already mentioned, namely, a training levy in proportion to the payrolls of all employers included in the scheme (private firms, public-sector enterprises, and government agencies). Experience in several countries suggests that a levy of one or two percent on gross wages and salaries will provide adequate funds for at least a good start on a program of occupational training. For administrative reasons, it is probably desirable to exempt very small employers --say those with less than 10 employees-- at least at first.

The levy should be partly or wholly rebated when employers establish and run adequate training programs of their own, as attested by OTO inspection based on agreed standards. In fact, a very important reason for recommending a compulsory training levy on employers is that the offer to rebate part or all of it provides a powerful lever with which to induce the employers to mount their own training programs. Such programs are likely to be both more realistic and less costly for equivalent results than training programs in a vocational school or other institution not directly tied to industry. Furthermore, the very fact that an employing organization is induced to establish and run a systematic training program will most probably improve the morale as well as the competence of its work force and raise the efficiency of its operations. Progressive employers realize this, and many of them, where the organization is large enough, already engage in training.

But in the absence of the kind of system recommended here, any employer who invests in a training program has to reckon with a more or less sizeable percentage of cases in which he gets little or no return on the investment, because some employees leave soon after training --perhaps hired away by another employer who thus gets trained personnel without paying the costs of training. This "leakage" of the benefits of training substantially reduces the incentive for any given employer to undertake training, unless he is very large or without competitors in the skills he trains for. The proposed OTO system, by contrast, says to each employer, "If you cannot or do not wish to do your share of training, you must pay the training levy and thus contribute towards the costs of having training provided elsewhere. On the other hand, if you are able and willing to do a good job of training, the OTO will reimburse at least part and perhaps all or more than all of your training costs."

There are, of course, other conceivable ways of financing an OTO and the training programs which it should stimulate. One alternative is to appropriate public revenues from general tax sources. In countries at relatively early stages of economic development it may be essential or advisable to start the OTO and its programs by covering some of the costs from the government's general funds or those earmarked for development.

Another possibility is to impose a levy on employers, but on some other basis than a percentage of wages and salaries --perhaps a percentage of capital, or of sales, or of income. In some respects, a payroll tax is not a good tax. It tends to increase the cost of labor in relation to capital and might, therefore, have an adverse effect on employment, encouraging employers to substitute machinery for labor. But the effect of a 1% or 2% tax is hardly likely to be significant in this respect, and the manifest equity of a training levy based on a figure which reflects the amount of human resources being used, plus the ease of administration (as compared with, say, a tax on capital, income, or output), turns the balance in its favor. Furthermore, if the proceeds of the payroll levy are well used and training programs financed by it increase the average efficiency of labor by, say, 5% or more, this will more than offset the 1% or 2% levy and produce a net encouraging effect on employment of labor. In rebuttal to this, of course, it can be said that the net encouraging effect on employment might be still larger if the funds had been raised by a tax on income or in some other manner that does not increase even slightly the cost of hiring labor.

The payroll levy has an additional advantage in that it can be applied to governmental, quasi-public, and non-commercial organizations, if it is thought desirable to bring them under the OTO system, not only to employers that have capitalization, sales, and earned income. Government agencies are often the largest employers of educated and trained personnel in newly developing countries.

Another way of financing training costs, particularly those made necessary by large development projects such as irrigation and power systems or steel mills, was suggested by a Commission on National Education in Pakistan a few years ago. The Commission recommended that a proportion, say 5 to 7 percent, of the cost of major development projects should be made over to the Ministry of Education in order to promote the education without which these projects would be unable to make progress (Curle 1966:156).

Methods of Work

The OTO should follow the policy of persuading and subsidizing other organizations --employers, schools, and training centers-- to undertake a large share of the actual training work. It should also cooperate closely with productivity centers, small industry service institutes, management associations, labor unions, and other agencies that are able to run good training programs. Where necessary, it should subsidize their training programs, besides assisting in the training of instructors, preparation of materials, and in other concrete ways.

Only where others cannot do the job that needs to be done, even with help from the OTO, should the OTO itself directly undertake a training task. In practice, it may have to do a substantial amount of such work in a newly developing country, because facilities and staffs are otherwise not available. For this reason, and also to discharge some of its other functions, the OTO may need to establish special schools or training centers of its own. Nevertheless, the general policy should be to hold this within reasonable limits in order to encourage a more decentralized and pluralistic approach and especially to make maximum use of the facilities (equipment and personnel) of the employing organizations themselves.

Very high priority should be given by the OTO to:

(1) analysis of current and future needs for occupational education and training,

(2) education and training of instructors,

(3) preparation of training materials and experimentation with new materials and methods,

(4) setting of standards for and inspection of aided training programs, and

(5) preparation and administration of examinations for testing attainment of a certain level of proficiency in specified types of occupational education and training.

SOME INSTRUCTIVE PRECEDENTS

For examples of some of the practices recommended here, we shall note the structure, financing, and working methods of a number of organizations in Latin America devoted to occupational training. Then attention will be drawn to the United Kingdon's new approach under its Industrial Training Act 1964; several features of that

Act and of steps taken for its implementation are very relevant and have suggestive value for other countries. Finally, some noteworthy proposals put forward in Nigeria in 1966 by the Comparative Technical Education Seminar Abroad will be cited.

There have been valuable experiences and innovations in other countries that also deserve the attention of those concerned with the planning of systems of occupational education and training for industrialization --for example, in Japan, the U.S.S.R., several European nations, and the United States-- but this paper cannot undertake a comprehensive survey.

In Latin America[1/]

A distinctive group of organizations for occupational training has grown up in Latin America, the first founded in 1942 and most of the others since 1957. They have been assisted by the ILO and also by bilateral aid programs. These organizations include:

SENAI in Brazil (Servicio Nacional de Aprendizagen Industrial -- National Service of Industrial Apprenticeship), dating from 1942. Later a similar organization in the field of commerce was established, SENAC.

SENA in Colombia (Servicio Nacional de Aprendizaje --National Apprenticeship Service), 1957

INCE in Venezuela (Instituto Nacional de Cooperación Educativa -- National Institute of Educational Cooperation), 1959

INACAP in Chile (Instituto Nacional de Capacitación Profesional -- National Institute of Occupational Training), founded in 1959 as SCT (Servicio de Cooperación Técnica --Technical Cooperation Service) and renamed in 1966.

CONET in Argentina (Comisión Nacional de Educación Técnica -- National Commission for Technical Education), 1960

SENATI in Peru (Servicio Nacional de Aprendizaje y Trabajo Industrial --National Service of Apprenticeship and Industrial Work), 1961

INA in Costa Rica (Instituto Nacional de Aprendizaje --National Training Institute), 1964

SECAP in Ecuador (Servicio Ecuatoriano de Capacitación Profesional -- Ecuadorean Training Service), 1966

[1/] Information based on reports and other documents of the organizations mentioned and on visits to several of them. See also U.N., 1964, Add. 2, Annex B, pp. 124-128.

Organizational Structure and Financing

Nearly all these organizations are autonomous public corporations created by law and financed by a tax on the payrolls of employing organizations. (An exception is INACAP, a subsidiary of CORFO, the Chilean development corporation; it is financed by CORFO, which in turn gets its funds from the government.) The rate of the payroll tax is generally 1%, but in the case of SENA has been raised to 2%.

The pioneer of the group, SENAI, was founded on the initiative of Brazilian industrial employers and is managed by their national confederation. SENAC is managed by the corresponding confederation of commercial employers. The more recently created organizations have governing bodies representative of various economic and social interests and government departments. For example, the National Administrative Council of INCE consists of a president, vice-president, and secretary-general appointed by the President of the Republic; representatives of the ministries of development, education, and labor; representatives of the chambers of agriculture, industry, and commerce; and representatives of farmers organizations, industrial workers, and the Venezuelan Teachers' Federation. On SENA's National Council are the Minister of Labor or his representative, the Minister of Education or his representative, and representatives of the Roman Catholic Church, industrial employers, commercial employers, agriculturalists, and workers.

Each organization has a full-time administrative head who directs a substantial staff. In some countries there are geographical divisions or, as in the case of Brazil, sub-organizations that have a considerable degree of autonomy in operations.

Scope and Nature of Activities

The earliest organization, SENAI, was established for industrial training only (supplemented later by SENAC for commercial training), but some of the more recent ones have a much broader mandate.

SENA is to provide "occupational training to workers, young and adult, in industry, commerce, agriculture, animal husbandry, and mining."

INCE lists as its specific aims:

1. To organize, develop, and promote occupational preparation of adult workers at all levels, by establishment of specialized courses and courses within enterprises, in cooperation with employers, and to collaborate in activities designed to increase productivity.

2. To organize, develop, and promote apprenticeship of young workers, in special schools or within the enterprises themselves in cooperation with employers.

3. To contribute to the agricultural training of rural school leavers, with the object of producing farmers capable of utilizing the land and other natural resources efficiently.

4. To collaborate in the battle against illiteracy and contribute to improvement of general primary education in the country, insofar as this advances occupational preparation.

5. To improve and prepare materials required for better occupational preparation of workers.

In fulfillment of these aims, INCE's activities include: determining national manpower requirements and those of specific industrial sectors; preparing manuals of instruction; organizing and promoting training within enterprises, by means of systematic apprenticeship for workers 14 to 18 years of age, training courses outside of working hours for specialization and advancement, instructor training, and training of foremen; and establishing training centers for those trades or occupations where a need is indicated by manpower surveys. INCE works not only with urban industry and commerce but also has an active rural program. While its regular program is directed mainly to workers already in service, the government has charged it with responsibility for a special program designed to give occupational training to 50,000 unemployed youths. This is supported by a special government grant.

SENATI in Peru has developed a noteworthy plan for aiding manufacturing firms to establish "Company Instruction Units". The firm is encouraged to designate a member of its staff as company training coordinator, and SENATI works with him in analyzing training needs, planning programs, and providing instructors or training company men to give instruction.

In the United Kingdom[1/]

The United Kingdom's industrial Training Act 1964 introduces important innovations that are having a profound effect on education and training for industry in that country.

Industrial Training Boards and Central Training Council

The Act empowers the Minister of Labour to appoint industrial training boards, after consultation with organizations representing employers and employees. By mid-1966 over a dozen had been established (for example, the Engineering Industry Training Board, the Iron and

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[1/] Information based on documents of the Ministry of Labour, the Department of Education and Science, and memoranda and information papers of the Central Training Council and various industry boards set up under the Industrial Training Act 1964, supplemented by interviews with officials involved in administration of the Act.

Steel Industry Training Board, the Construction Industry Training Board, etc.) and it was expected that there would ultimately be about thirty. Some of the boards are establishing joint committees to handle overlapping problems.

Each board consists of a paid chairman, an equal number of representatives of employers and employees, and other members appointed after consultation with the Secretary of State and the Minister of Education. Only the representatives of employers and employees may vote on imposition of a levy. Nationalized industries are treated as employers.

The Minister has also appointed a Central Training Council, as authorized by the Act. It consists of a chairman, six members each appointed in consultation with organizations of employers and of employees, two members appointed after consultation with nationalized industries, not more than six chairmen of Industrial Training Boards, and twelve other members, of whom six are appointed after consultation with the Secretary of State and the Minister of Education. The Council advises the Minister on the exercise of his functions under the Act. It has established a number of working committees and issued studies and policy memoranda on such topics as the training of training officers, industrial training and further education, training in safety, and the use of programmed instruction.

The Levy and Grant System

Each board assesses the training situation and training needs in its industry and takes steps to meet the needs more adequately. Funds for this purpose are raised by imposition of a levy on employers in the industry, the rate being determined by each board with the approval of the Minister. In the engineering industry, the amount of the first annual levy was 2 1/2% of total wages and salaries, which the Board said "was set to yield a sum roughly equal to the present cost of training in the industry." Other early levies were 0.75% of total wages and salaries in the wool industry, 0.55% in shipbuilding, 0.5% in construction (raised the second year to 1%), and £7 per employee in the iron and steel industry.

The Act authorizes the boards to operate a system of training grants designed to increase the amount and quality of training. The Engineering Industry Training Board has notified its constituents that grants for training during 1966 would consist of two parts: the general grant, which will be based on verified costs of each employer's training arrangements, and a series of supplementary grants for aspects of training to which the Board wishes to give special encouragement. "In due course the Board will publish standards and only firms reaching the standards will be awarded a full performance rating which will entitle them to maximum grant." The Board will take into account the quantity and character of the training being done in each of three broad categories: (1) training of managerial, technical, commercial, clerical and supervisory staff; (2) apprentice training or equivalent training for skilled crafts; and (3) operative training. The Board adds:

> "The relationship between the performance ratings and the percentage of its levy payable to a firm in grant will be set so as to give the firm with a high performance rating a grant in excess of its levy; this is, to reward the firm already doing good training with, in effect, a net payment towards the cost of that training. The firm doing too little training, or training of inadequate standard will, through the levy and grant system, be making a net payment to the Board. Taken together, therefore, the levy and general grant schemes will redistribute part of the existing training costs, and make a financial contribution towards the training costs of those firms who are prepared to improve both the size of their training programmes and their standard training."

Ways of Working and Some Effects

There are indications that the training boards in combination with the levy-grant scheme are exerting a significant influence for wide dissemination throughout industry of better training practices. Furthermore, the new system seems to be producing a ferment of ideas and innovations. Again taking the Engineering Industry Training Board as the example, the Board in May 1966 published a handbook on a recommended pattern of first year training for craftsmen and technicians. It is also considering a structure of further training after the basic first year which would introduce a flexible system of "training modules" and "experience modules" designed to replace the rigidities of former systems of uniform syllabuses and fixed lengths of training. The Board is encouraging group training schemes for smaller firms which cannot themselves provide a full range of training facilities; it offers grants to cover the cost of employing a group training officer and for administrative expenses during the development of a new group scheme. The Board also intends itself to provide and equip workshops for the first year apprentice training of craftsmen and technicians; the workshops will be pre-fabricated and will each have a minimum of thirty places. They will be available for use by group schemes. The Board will pay grants to employers who send staff to training courses for training officers or instructors; approved courses are being offered at some twenty technical colleges and other institutions. The Board invites applications from any firm, organization, or educational body for grants to support research projects directed towards improving the effectiveness of training.

Another apparent effect of the new system is to promote closer, more continuous, and better organized cooperation between industry and educational institutions. All approved training programs must include associated "further education." This seems likely to increase the demands on and the support for educational institutions offering appropriate courses on a "day release," "block release," or other part-time basis. There are educational members on all training boards, and the Central Training Council is encouraging close contacts at regional and local levels between those responsible for training programs and the education authorities. Grants are available to firms which provide practical training for students during the industrial part of "sandwich" courses (alternating between institutional and in-plant work). These grants apply whether the student is employed by the firm, by another firm, or is based at an educational institution and not actually in employment.

Finally, the system is working to persuade management that, in the words of a Central Training Council memorandum, "sound and well-organized training is essential to the greater efficiency and profitability of an undertaking" and that the scope of training efforts should extend to all types of industrial occupations and to mature persons as well as youths.

In Nigeria

Eighteen of the most experienced Nigerian technical education officers, designated by the Ministries of Education of the Federal and Regional governments, constituted a "Comparative Technical Education Seminar Abroad" under the chairmanship of Dr. Adam Skapski of the Ford Foundation. After inspection of vocational and technical education systems in four countries and numerous working sessions at home, the Seminar submitted a notable report in mid-1966 (Nigeria 1966).

The Report contains important recommendations, of interest in other countries as well as in Nigeria, on general education and pre-vocational and pre-technical training and on the role of industry in vocational and technical training. It is hoped that a copy can be made available to each Workshop participant in advance, to serve as a basis for part of the Workshop discussion.

Chapter 5

THE ROLE OF THE REGULAR EDUCATIONAL SYSTEM: GENERAL AND PRE-OCCUPATIONAL EDUCATION

In the planning model for occupational education and training proposed in Chapter 3, general and occupational education (Phases 1 and 2) were stated to be the responsibility of the school system; training, in the sense of specific preparation for a rather narrowly defined job (part of Phases 3 and 4), was designated as properly a responsibility of the employment system. Programs and institutions to provide links between Phases 2 and 3 (labelled "Phase 2 1/2") and provision for further education in combination with training and retraining in Phases 3 and 4 were described as a joint responsibility for which the respective contributions of the school system and the employment system (funds, facilities, and personnel) should be coordinated through some type of linkage organization referred to as an OTO. This chapter will explore further into aspects of general and vocational education and the responsibility of the school system. Chapter 6 will do the same for training and the responsibility of the employment system.

General Education and Development

Two characteristics of modern development place enormous tasks on education. First, modern development brings an increasing degree of specialization, "technicalization," and complexity into the processes of production and also into the functioning of the economic-social-political system. Second, it steps up the pace of change in nearly all aspects of life and work.

The first characteristic necessitates education for more people, a higher average level of education, and also new kinds of educational content. Education must emphasize skills, knowledge, and personality traits different from those required in traditional societies. In particular, education must give greater weight than in the past to scientific and technological content. Through its methods of instruction, it must seek to impart scientific and technological (that is, inquiring and problem-solving) attitudes. "Scientific" and "technological" here, as elsewhere in this essay, include the scientific and technological approach to economic-social-political problems as well as to physical and biological problems.

A recent United Nations study observed that the background of children growing up in newly developing countries is "often alien to the attitudes valued in a technological society. Children in an industrilized country nowadays grow up with a considerable background of technical information; in the developing countries lack of such a background presents a serious handicap . . . ." In the words of the same study, "the level of general education required before technical education can be effective is rising steadily . . . . By comparison with the industrialized countries, pupils in similar educational institutions of the developing countries tend to begin pure vocational training, or specialization for particular skills, at a much earlier age. The results are unsatisfactory, partly because the technical and vocational schools often have to make good the deficiencies of primary school instruction and partly because the pupils are not old or mature enough." (U.N. 1964, Add. I:45.)

The second characteristic of modern development, namely, the rapid pace of change, requires that education put greater weight than in the past on preparing people to be adaptable, versatile, and occupationally mobile. ". . . [Formerly]," said Alfred North Whitehead, "the time-span of important change was considerably longer than that of a single human life. Thus mankind was trained to adapt itself to fixed conditions. But today this time-span is considerably shorter than that of a human life, and accordingly our training must prepare individuals to face a novelty of conditions." (Whitehead 1931:xix.) When change was less rapid, the information and ideas that a person acquired in his youth could serve him fairly well for the rest of his life. He could perform reasonably well as a producer and a citizen without having to learn or relearn much in his adult years or to change his opinions. But in an environment of rapid change, specific skills become obsolete and new ones have to be acquired, and ideas that were right yesterday may be wrong today, or irrelevant.

Both from the individual and the social point of view, this is a powerful argument for providing as much general education as possible and also for making occupational preparation broad-based, with emphasis on understanding and technical versatility.

Because modern development demands a high average level of education, including new knowledge and attitudes suitable to a scientific and technological age, and because the pace of change in a modern or modernizing country makes adaptability extremely important, an ample foundation of general education should, to the extent possible, precede specialized preparation for an occupation. Each person, given normal aptitudes and interests, should have as much general education as he and the country can afford. In the poorest countries, even the minimum required to produce functional and lasting literacy (which educators estimate at about four years of primary schooling, though highly motivated adults may learn the equivalent in much less time) is still unavailable for a considerable fraction of the rising generation, not to speak of those in the working ages whose generation was even less well provided with educational opportunity.

General education well into or through the secondary level for increasing proportions of the population is a highly important goal as a basis for the supply of middle-level manpower needed in economic, political, and social development. To provide the high-level manpower required to man many posts in administration and management and in the professions, general education that extends into or through the tertiary (university) level prior to occupational specialization must be made available to a particularly promising fraction of the population.

The first requisite of good occupational preparation to meet the needs of modernization is, therefore, a good system of general education.

Pre-Occupational Education

Throughout general education, at the primary level, especially at the secondary, and even at the tertiary for those fortunate enough to continue their general education through or into university, there should be a conscious effort by curriculum planners, teachers and teacher trainers, and those who prepare textbooks, syllabuses, and other instructional materials, to interrelate academic subject-matter with learning about the world of work. Attention should be given to acquiring skills, knowledge, and personality traits that will be applicable and transferable in a wide range of possible occupations. This can be done by visits to observe people doing various kinds of jobs, by choice of problems to work on, by interviews with and talks from persons in a variety of occupations about their work, and by workshop and laboratory experiences designed to link the abstract formulations of knowledge to the workaday world. To the extent that such an educational policy is implemented, the transition from general to what we are calling "pre-occupational" education will be quite gradual.

Some two or three years before a student ends his school career, there should be a substantial increase in the amount of attention devoted to pre-occupational elements. This stage will occur at different levels for different groups. At whatever level, the purpose should still be one of education, rather than very specific job training, but the education would be somewhat more focused towards the skills, knowledge, and personality traits needed in a selected range of occupations.

For the very large numbers who, in many newly developing countries, can expect no schooling beyond the primary level or even drop out before completion of primary school, the most important thing undoubtedly is to strive for functional literacy, basic skills in computation, and elementary notions of science and technology related to the physical, biological, and social environment. Such elementary education to serve as a foundation for learning on the job and for taking advantage of educational opportunities in adult life is likely to be more useful than any direct occupational preparation that can be assimilated at this stage of maturity. However, as much as possible should be done to broaden the pupils' information about the various kinds of occupational opportunities likely to be open to them and to give them an idea of the requirements for success in these occupations.

At the secondary level, students who are likely to head towards employment in the mechanical trades should be given extra instruction in shop mathematics, mechanical drawing, use of basic hand and machine tools, and proper maintenance of equipment. At the same time, they would continue their general education. Other secondary students for whom a commercial occupation seems most likely should have extra instruction in subjects like accounting, elementary management principles, and skills such as typing and use of office machines, along with continued general education. There would be other pre-occupational programs at the secondary and higher levels designed to fit the country's emerging occupational opportunities and needs. The aim of each such program, to repeat, should be to produce not fully trained people but trainable people, equipped with basic skills, knowledge, and personality traits that will enable them to learn quickly any of a variety of specific jobs within their range of aptitudes and preparation.

An integral part of all pre-occupational programs should be instruction about the different types of occupations and jobs, their requirements, and sources of information about the labor market and the outlook for various careers. This should be accompanied by individualized aptitude testing and counseling, to help the student make intelligent choice among occupational possibilities.

This concept of pre-occupational education recognizes the reality that large groups leave the school system at each of several different levels and that each leaving group deserves to be prepared as well as possible to find suitable employment, to learn on the job, and to continue to learn and relearn throughout a working lifetime. It also assumes that specific training and opportunities for further education will be made available during employment: this is an essential part of the approach to occupational education and training here put forward. On this basis, the school system can be largely relieved of responsibility for training and can concentrate on general education, topped off towards the end of each person's schooling with occupationally-oriented instruction and counseling.

Integrating "Academic" and Occupational Elements in School Curricula

It is proposed that the Workshop give attention to emerging concepts that would call for and help to achieve an interweaving and integration of traditional academic subject-matter with pre-occupational elements. A few references and excerpts will illustrate some of the ideas that seem to be gaining support. The citations here are all from recent writings in the United States, but probably similar issues are being raised in other countries, and whatever additional information and materials Workshop participants can bring will be appreciated.

1. From a paper "Designing an Organic Curriculum" by Robert M. Morgan and David S. Bushnell (1966) the following thoughts are excerpted:

> " . . . [About] eight out of ten . . . students [in the United States] will be candidates for jobs requiring less than a college degree.
>
> "Yet only one of these eight received any kind of occupational training in the public schools! . . . (p. 4)
>
> . . . .
>
> " . . .The tendency in the past to separate general and vocational education has penalized both those who are college-bound and those who plan to terminate their formal education at the end of high school or junior college. The academically oriented students are directed to those college preparatory programs which will enhance their performance on the college entrance exams. They have little opportunity to acquire a knowledge of the functionings of the business and industrial community. At the same time, vocational students receive too little opportunity to develop competence in the basic learning skills which they must have if they are to cope adequately with present day society.
>
> "The tendency to separate those in the college preparatory programs and those who have been tagged as vocationally oriented handicaps both groups. Those who plan to go on to college are not at all prepared to cope with the question, 'What happens if I must leave college before graduation?' On the other hand, those exposed to current vocational programs find themselves being trained for a narrow range of job skills. . . . (p. 6,7)
>
> "From the perspective of providing for the optimum development of all students, . . . types of curriculum available in the secondary schools are inadequate.
>
> " . . . [There is] a need for major revisions . . . . (p.7)
>
> . . . .

" . . . Recent pilot efforts of redesign of an entire curriculum are in evidence . . . .

"In Richmond, California, for example, a major effort was made to integrate the vocational and general educational curricula . . . .

"Another effort in relating the verbal-skill-oriented high school's general education program to the interests of many students was carried out by an M.I.T. curriculum study group last summer under the leadership of Professor Nathaniel Frank . . . . (p. 9)

"A recently appointed curriculum advisory group to the Bureau of Research in the U.S. Office of Education . . . has recommended that an extensive redefinition of the total curriculum must be made to meet the needs of those students who neither go on to college nor graduate from high school with occupational skills. (p. 10)

. . . .

"The first step in building such a curriculum is to look at those behavioral requirements needed for entry into . . . a variety of post-high school activities. . . . What are the ingredients of a high school program which will assure the attainment of these specifications? It will likely include academic as well as occupational training but may also include such components as personal development, real work experience, and post-high school placement functions . . . . (p. 11)

"There will be no discrete demarcation between academic and vocational skill training or between these and other parts of the system . . . . (p. 12)

. . . .

" . . . The new curriculum should:

(1) Emphasize the articulation between academic and vocational learning for the purpose of fusing the two programs. Employing vocational preparation as the principal vehicle, the inculcation of basic learning skills could be made more palatable to many students who otherwise have difficulty seeing the value of a general education.

(2) Expose the student to an understanding of the 'real world' through a series of experiences which capitalize on the universal desire of youth to investigate for himself. Abstract, verbal principles would

be acquired through non-verbal stimuli, such as seeing, feeling, manipulating, and even smelling.

(3) Develop a core of generalizable skills related to a cluster of occupations rather than just those related to one specialized occupation.

(4) Orient students to the attitudes and habits which go with successful job performance.

(5) Provide a background for the prospective worker by helping him to understand how he fits within the economic and civic institutions of our country.

(6) Make students aware that learning is life-oriented and need not, indeed must not, stop with his exit from formal education.

(7) Help students cope with a changing labor market through developing their problem-solving ability and career strategies which can lead to an adequate level of income and responsibility.

(8) Create within the student a sense of self-reliance and awareness which leads him to seek out appropriate careers with realistic aspiration levels." (p. 13)

2. The Final Report of the Summer Study on Occupational-Vocational and Technical Education (July 6 - August 13, 1965, Massachusetts Institute of Technology) reports substantial agreement among working groups on a number of basic issues:

> "First, there is need to treat vocational-occupational education as an integral part of the common core of all education. . . .
>
> "Second, current vocational education should be expanded and generalized so that working with materials, with systems and with processes provides a base for intellectual growth along both traditional academic and vocational paths.
>
> "Third, some of the new vocational education should be part of the educational experience of all students and, conversely, some of the classical disciplinary type of education should be part of this experience.

> "Fourth, there is need, early in a student's schooling, to replace the traditional division of education into separate disciplines by an educational pattern in which current categories of subjects are not readily identifiable. This should be initiated at the beginning of the junior high school program. Such an operation will use as central facilities shops or working areas such as laboratories and will call for the development of a new kind of cooperative group teaching effort.
>
> "Fifth, the junior high school pattern of experimentally and experientially based education should evolve continuously into a few broad but closely connected avenues of education in senior high school. These should have no terminal educational goals, but . . . provide foundations for continuing education whether it be on the job or in formal post high school curricula.
>
> "Sixth, education for vocational competence should build in flexibility and adaptability to produce transferable knowledge and skills . . . ." (p. 1-2)

3. A paper on "Making Education Relevant" by Marvin J. Feldman, Program Associate, the Ford Foundation, for the Governor's Conference on Education, State of New Jersey, Rutgers University, April 2, 1966, expounds ideas which are being explored in a number of curriculum experiments for which the Foundation has made grants:

> " . . . Some children who are less verbally gifted and who do not look at things from an abstract point of view . . . can learn the content of general education through the very techniques of vocational education . . . . (p. 4)
>
> . . . .
>
> "We need to create in our elementary and secondary schools a coordinated curriculum where vocational and general education reinforce each other; . . . where students are taught general work skills that are transferable from one occupation to another . . . . (p. 6)
>
> . . . .
>
> "Liberal education is more than an education for a gentleman of leisure . . . and should in no way foreclose technical education. An educational program can . . . teach youngsters not only how to prepare for better lives, but also for better occupations . . . .

> "In pursuing this purpose, the two approaches need to be integrated throughout the entire educational experience. The current tendency to give a student initial general education, then specialization, _is inappropriate on pedagogical grounds, and is at the root of the major problems in curriculum development_. [Emphasis in original.] Nor does it fit an educational philosophy which holds that culture and vocation cannot be separated." (p. 10-11)

Comprehensive (Multi-Channel) vs. Occupationally Specialized Secondary Schools

Among the policy issues that educational planners in newly developing countries must confront is one that has been a center of controversy and reform movements in many countries in recent years. The choice is between two patterns for developing the secondary school system. Which is better? --

1. Two (or more) sets of secondary schools, one with a "vocational" orientation, leading mainly to manual occupations, trades, possibly submanagerial or subprofessional employments; another with an "academic" orientation catering to those who intend to go on to university and thence to professional or managerial careers; or,

2. A single set of "comprehensive" (multi-channel) secondary schools, serving in the same school youngsters headed for early employment and those headed for university, providing a common school experience in a core of general education and extracurricular activities in which all share, but gradually guiding students into "channels" or "streams" on the basis of demonstrated aptitudes, achievements, and interests.

The first is the older system. It has long prevailed in Europe, but is now in retreat there. Through example or colonial policy it has spread to many of the newly developing countries. The second system is most prominently exemplified in the United States and is generally favored by American educational philosophers and policy makers.

Is the "comprehensive" approach a suitable one for newly developing countries? Or is the order tradition of separate schools the better one? This is an issue the Workshop will want to explore. My own view is, tentatively, that newly developing countries will be well advised to aim their plans towards comprehensive schools, on the following grounds:

1. On democratic grounds. Experience shows that when children are steered at the age of eleven or so into separate academically-oriented and vocationally-oriented schools, the selection is heavily conditioned by class background. The economic, social, and political status of the family generally plays a decisive role. Even where objective tests are used, the test results reflect opportunities or deprivations in the home. The dual system of education thus tends to perpetuate class distinctions and inequalities of opportunity and to limit social and occupational mobility. It restricts both the rise of talented people from the lower strata and the fall of less talented ones from the higher strata.

2. On child development grounds. At the age of entry into secondary school it is premature to commit a child to a certain range of occupational choices and preclude others by the nature of his schooling. Occupational commitment should be postponed to a later stage, and meanwhile the educational program should be a broad one designed to discover and develop latent aptitudes and interests. Even at later stages, after a start has been made in a particular direction, there should always be cross-over possibilities by which a shift can be made to another type of program, and this is more likely to be feasible in a comprehensive school.

3. On grounds of best use of human resources. Perpetuation of differences in class status and home opportunities deprives society of latent talent which goes undiscovered and undeveloped. On the other hand, school policies which encourage the development of individual talent, from whatever social source, towards any type of occupation for which the individual shows aptitude, are powerful means of developing to the full the human resources on which modern development critically depends.

4. On grounds of educational efficiency. In some countries vocational schools and academically-oriented schools are separately administered, with the wasteful result that in the same town a school of one type may be underoccupied and overstaffed while a neighboring school of the other type is overcrowded and understaffed. Consolidation into a comprehensive school would permit lower costs per pupil by enabling more efficient utilization of instructors, buildings, equipment, and materials.

5. On grounds of educational content. All students, including those who go on to university and professional or managerial careers, should receive some exposure to industrial arts or manual skills in the form of shop courses. Likewise, all students, including those likely to be manual workers, should have a basic general education that includes the development of communication skills, humanistic studies, elementary natural and social science, and development of attitudes that make for effective performance as producers, citizens, and persons. The comprehensive or multi-channel school can more readily provide these broadening educational experiences. Also,

the common participation of youngsters from various social backgrounds in school games and other extra-curricular activities as well as in classrooms and laboratories is itself a valuable educational experience from the standpoint of fastening truly democratic development.

There are, however, arguments on the other side. One vocational educator with much experience in international technical assistance has written: "While the comprehensive high school might be an excellent form in the American educational technology, it seems to be more ideally suited for the highly developed American industrial metropolis than to the village-dispersed populations of underdeveloped countries. The comprehensive high school also requires a sophisticated instructional organization and teaching force, and a leadership with an exceptionally well-balanced philosophy of education. These are lacking at the present time in most developing countries." (Rao 1962)

Probably the arguments in favor of the comprehensive as over against the dual system of education weigh more heavily at the lower secondary level (junior high school, about ages 11 - 14) than at the upper secondary level (senior high school, about ages 15 - 18). Many young people have to go to work at age 15 or earlier, and while the long-range goal should undoubtedly be to keep nearly all in school through the upper secondary level, as is happening in the affluent countries, this is not a near-term possibility for most newly developing countries. There is, therefore, an important role for trade schools of various kinds at the upper secondary level *provided the trade schools can be intimately tied in with industry and commerce*. The main functions of the trade schools should be to provide part-time instruction *for employed youths and adults* who are also learning on the job. By "sandwich" or "block-release" arrangements or in evening hours these employed people would receive additional vocational instruction and further general education in teaching-workshops, classrooms, and laboratories.

There is also, of course, a strong justification for special schools of the technical institute type preparing sub-professionals; these schools will often overlap the upper secondary and the junior college level.

Chapter 6

THE ROLE OF THE SECOND EDUCATIONAL SYSTEM: JOB-ENTRY AND CAREER-LONG TRAINING AND EDUCATION

Of the three components in good occupational preparation -- education, training, and work experience-- one, work experience, can only be provided on the job. This may perhaps be simulated during training, but can rarely have the maturing effect or impart the same confidence as the real thing. On the other hand, a haphazard, unstructured, and educationally unsupervised work experience may provide learning mainly in bad methods of work or how to humor the boss. The learning from work experience can usually be multiplied and be made more transferable to other subsequent work situations by arrangements which alternate periods on the job with periods in a classroom or instructional workshop or laboratory under the guidance of a qualified instructor. The instructor can help to build interrelations between concrete aspects of the job and general principles and competencies. Arrangements which alternate work experience with continued education and training of a systematic sort are highly favored by experts in these matters.

In the early days of modern industrial development the work experience component was almost everything and the systematic training component little or nothing in preparing people for jobs. As a student of industrial training in Britain put it, most young people entering industry in that country until quite recently have been "expected to learn what they are supposed to do by the time-honored process of 'sitting next to Nelly'" (Williams 1963:14). Today in newly developing countries most of the learning in traditional industries, much of it in partly modern industries and commerce, and a large proportion in agriculture and other activities is picked up informally in work experience. Where traditional apprenticeship systems prevail, the instruction may be minimal and haphazard.

Often, however, an informal system of training on the job achieves fairly good results. For example, a study of a segment of Brazilian industry which manufactures boilers and similar capital goods reports that quite high skills have been developed in a large body of workers by an informal procedure in which a new shop employee is first put at relatively simple tasks and then step by step is advanced to more complex tasks, always alongside experienced workers who assist him as needed. Typically, these Brazilian skilled workers have entered the shop with only three to four years of formal schooling. Foremen generally have five or six years of schooling. (Leff 1966.)

This kind of preparation becomes less and less adequate, however, as a developing country strives to create modern industry, modern agriculture, modern health services, modern governmental administration, and all the other innovations requiring better qualified personnel. Methods of work in all these fields continue to become more specialized and sophisticated, to require more understanding of theory and of complex techniques, and more managerial ability in planning and coordinating.

The result is a need for both a better foundation in general education and more systematic training in combination with work experience.

One objective of a good plan for occupational education and training, as suggested earlier, should be to make every employing organization a training organization. Large employers can and should mount their own training programs, assisted by an organization of the OTO type in such matters as instructor-training and preparation of instructional materials. They should work in close association with schools, technical colleges, universities, and other units of the regular educational system, especially for provision of further education. Smaller employers can and should cooperate in group training centers or hire the services of training institutions. In each case, grants from the OTO should cover a substantial part if not all of the costs.

It is worthwhile to repeat that "employing organizations" in this context emphatically does include public enterprises and the ministries and other agencies of government. They, too, should recognize training of their own personnel as a continuous responsibility. In newly developing countries government is often the largest employer of qualified personnel. It may not be feasible to organize training programs in all government agencies within a few years, but this should be the long-range aim. Meanwhile, there probably are some government organizations that already have their own training programs --possibly public works, transport agencies, etc.,-- and a gradual improvement and expansion can be planned.

Will employers be willing to devote to training programs the time, energy, personnel, and money that good programs require? More particularly, in view of the recommendation that specific job training take place, so far as feasible, at the point of employment or after employment rather than before, will employers be willing to take untrained (but trainable) youths and train them? The answer is that the more progressive and better-managed employing organizations do these things now. Modern managements consider training to be one of their most important management tools, and therefore a continuing part of the regular process of running their organizations. Well-planned and well-executed training programs are a means of giving leadership without coercion, oftentimes more effectively than can be done by issuing orders. According to a British authority, "companies which have introduced systematic training have found that it has yielded direct benefits by the increased efficiency of their workers achieved in a shorter period of time, and that it has contributed notably to the lowering of the labor turnover and of accident rates." (Williams 1963:14.) In other words, enlightened self-interest is on the side of good training programs, and one of the tasks of the OTO will be to get this point across to public and private employers.

The importance of adequate training programs in countries striving for modern development is so great that the social interest justifies some special incentives and some compulsory features,

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along with persuasion. The best approach so far devised, as outlined earlier, appears to be a compulsory levy, probably in the form of a tax on payrolls, the proceeds of which are turned over to an OTO to support training activities. The OTO then makes grants or rebates to employing organizations for the costs of training activities, provided these meet reasonable standards of quality.

JOB-ENTRY TRAINING

Shifting Specific Training to the Point of Employment

So far as feasible, specific job training should occur during rather than before employment, or at any rate near to the point of employment and, if possible, with at least a tentative commitment to employment (as in the case of a "sponsored" student in a trade school or technical college). While this general principle is sound and important, it should be applied flexibly and with exceptions, as already stated in Chapter 3. Examples were given there of situations where exceptions are necessary or desirable, and these need not be repeated. Instead, we shall focus here on the general principle.

The tasks of the regular school system are to impart general education, meaning very widely applicable skills, knowledge, and personality traits, and to top this off just before the student is likely to leave full-time schooling with occupational information and counseling and instruction that has an occupational bias appropriate for the student concerned. The task of the employment system should be to take these trainable people and develop them further, especially with respect to those specific skills, knowledge, and personality traits needed for good performance in the exact jobs that have to be done.

In this task the continued cooperation of the education system is also needed. For some kinds of training, part-time use of school classrooms, laboratories, or teaching-workshops may add to the efficiency of instruction or save costs. Also, further education should normally be associated with training programs, and this is a function the education system is usually best qualified to perform.

With these provisos, training to qualify for a particular type of job, specific to a certain group of industries or activities, should normally be provided by the employing organizations themselves. There are many reasons for recommending such a policy. They can be summarized under five headings:

1. Better Coordination between Training and the Demands of the Labor Market

When specific training is given during or at the point of employment, "it is committed rather than potential workers who are trained," in the words of C. Arnold Anderson. "Under such conditions the numbers trained are likely to correspond fairly closely to the effective demand. Planning offices, by contrast, seldom can build forecasts for skills on solid evidence." (Anderson 1966:11) The system of in-employment training rather than pre-employment training provides an immediate feedback from the evolving needs of employers to current training programs and thus should result in quicker responses to constantly changing needs as some kinds of jobs become obsolete and new demands arise for others. In consequence, there will be less waste to society and less frustration for individuals from misdirected training for nonexistent jobs or from failure to train for urgently required new skills.

2. More Realistic and Appropriate Training

In-employment training tends to produce more realistic training. The training programs are almost certain to be attuned to real needs, imparting skills and working methods actually in use or being introduced rather than some outdated technology (or, at the other extreme, a technology so new or expensive that its current use in the country is extremely limited).

Important aspects of training can best be carried on when the trainee experiences real working conditions. A school cannot duplicate, for example, the atmosphere of a factory or an office, the pressure for production, the problems of getting along with fellow workers and supervisors in a real job, or relations with customers. The fact that a school does not exactly duplicate working conditions offers advantages as well as disadvantages, for the school can concentrate on systematic, comprehensive training given in the proper sequence. Therefore, a combination of on-the-job and in-school training is usually better than either separately. (National Manpower Council staff, in David (ed.), 1960:156.)

A practically insoluble problem for vocational schools is to provide facilities (equipment and instructors) for training in the great variety of occupations and skills required by modern industry and to keep these abreast of continual changes. Only combined training programs which make joint use of school and industry facilities can overcome this difficulty.

One result of too exclusive reliance on in-school training is that the traditional skilled trades tend to be overemphasized, while newer and rapidly expanding occupations may be neglected. Also, because of the high value often placed by schools and their students on certificates, the training may be steered more by the examination system than by the real needs of production. The examinations are too often outmoded, or, where internationally recognized examinations are used in the effort to maintain good standards, they may be inappropriate to local conditions. For example, in several West African countries where they syllabuses and examinations of the City and Guilds of London Institute are used in trade schools, trainees for certain trades spend time learning to lay up brick fireplaces or to hang wallpaper --skills not pertinent to tropical Africa.[1]

Sometimes a fully-rounded craft course as prescribed by syllabus and certificate requirements is wasteful. Boys at a trade training center in Enugu, Eastern Nigeria, after studying painting and decorating for three years, mostly go to work at spray-painting of automobiles. (Goldway 1962). A three-months course focused on this particular job, organized for employed workers in cooperation with employers, would be more appropriate. The time saved could be used for additional science, mathematics, language, and basic shop skills. For workers who do in fact enter other kinds of painting and decorating jobs or later shift to them, appropriate short courses could be given at or near the time of employment.

Training during employment in intimate association with real tasks will have a wholesome effect in putting certificates into proper perspective and in supporting the efforts of those who are striving to reform inappropriate examinations. The best examination, after all, is performance on the job, and, if the employing organization is competently run, this will be reflected in the employee's earnings and promotions.

3. Advantages in Quality and Cost of Equipment and Instructors

Training programs organized by or in close cooperation with employing organizations, serving persons whom they already employ or expect to employ, would usually have access to regular production equipment for training purposes --at least to the extent of observation and demonstration, and in many cases for actual operation by trainees under guidance. This would make possible a much wider variety of training programs, would familiarize the trainees with truly appropriate equipment, and would make it unnecessary for schools to purchase highly specialized equipment that is expensive and seldom used. Where technological change is rapid --for example, in the chemical and electronics industries-- not only the original cost of specialized equipment but the need for constant replacement may make it unfeasible for schools to provide adequate training in certain skills, but this difficulty is much less where industry itself does the training or cooperates closely.

Similar considerations apply with respect to drawing on experienced personnel as instructors or demonstrators in training programs. It is well known that one of the greatest obstacles the newly developing countries face is the shortage of competent, well-trained instructors who are able to give up-to-date and truly practical training in modern techniques. If employing organizations undertake to train their own employees, this would not solve the problem of instructor shortage, but it would mitigate it. Where the employing organization is running its own training program, it can call on its own experienced people to participate from time to time. Also, it has ready access to their advice in planning the content of training programs.

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[1] Personal reports by observers. Also Goldway, 1962.

4. Earning while Learning

A system that trains during employment rather than prior to employment enables the trainees to earn something, even if less than a full wage, while learning. This can be very important in opening training opportunities to members of poor families for whom full-time training in an institution, even with free tuition, may not be feasible because of the "opportunity cost" of foregone earnings.

Another advantage of in-employment training is that it gives the learner greater security. He knows that if he does reasonably well he can count on continuing to have a job. Peter Kilby reports from West Africa that even when some of the trade centers for training craftsmen lacked a sufficient quota of applicants, the training schemes launched by large firms attracted large numbers of applicants for the reason that job security with the company was guaranteed. (Kilby 1964:189-90.)

5. Motivation of Learners, Less Wastage

The learner who is being trained during employment can see very directly how his training relates to the job he is doing or about to do, also how it relates to more advanced jobs which he can see going on about him and to which he might hope to be promoted. Usually this will be an extra source of motivation not enjoyed by one undergoing training in an institution prior to employment. Moreover, actual experience on a job is likely to make the training more understandable.

Large wastage often occurs in school training programs because some trainees drop out before completion of the course and others do not enter the occupation for which they were trained. Training during employment rather than before helps to lessen these sources of inefficiency.

In some countries where the demand for places in secondary schools or universities far exceeds the supply, many students have to be eliminated by examinations or otherwise along the way. Vocational schools then tend to become a recourse for those who have failed to climb the regular academic ladder. Students come not with the intention of practicing the occupation for which the training is designed, but rather in quest of a back door through which they may try again to reach the higher academic levels. This also represents a serious wastage, intensified by the fact that the costs per pupil in a vocational school are several times those in a more academic institution. This is another valid reason for giving priority in vocational training to those who have already accepted employment.

Combined Systems: On the Job and in School

The education system is in a better position than the employment system to perform certain kinds of functions in occupational preparation. Among them are provision of basic knowledge and skills applicable in many kinds of jobs and adaptable to instruction in classrooms, school laborabories, and teaching workshops without excessively expensive or specialized equipment. The employment system, on the other hand, is better able to give realistic experience in a working environment, to provide training for specific jobs, and to provide opportunities for learning by demonstration and practice on real production equipment under the tutelage of men thoroughly familiar with current production practices. A combined system that draws on the strengths of both is therefore the best approach to occupational education and training.

Lacking in most newly developing countries today is a vigorous, systematic program of training within the employment system itself. If such a program can be started and strongly supported, through some such mechanism as an OTO, then the way will be open for developing combined programs that make the best use of the respective resources of the education system and the employment system to prepare the qualified personnel needed in development.

In the United Kingdom, the Industrial Training Act 1964 lays upon industrial training boards the duty to recommend not only the nature of training courses but also "the further education to be associated with training . . . ." While a formal division of responsibility is recognized --industry to provide skilled training to meet specific requirements and the education authorities to provide education service-- the Central Training Council has emphasized that "further education and training are complementary aspects of a single process." Explaining the reasoning behind the important principal that "recommendations on training should include, as an essential element, associated further education," the Council has said:

> "The increasingly complex industrial environment, the rapid pace of technological change, and intense international competition demand a work force which is both highly trained and educated. In recent years it has therefore become generally recognized that a programme combining education and training is essential if

> people in industry are to be equipped to carry out their work effectively as well as to have the opportunity to advance to more demanding and responsible work. Educational courses have been adapted and diversified in recognition of this, in order to meet both specific occupational requirements, and also to provide the means of upgrading in industry. We cannot emphasize too strongly that the more effective integration of the elements of technical education, systematic instruction in the basic skills, and practical experience, under supervision, on the job, must be one of the main objectives for industry and the education service alike . . . ." (United Kingdom 1965, 1966.)

Sweden has developed an effective system of factory-school cooperation, reported by Lady Gertrude Williams in her study of European apprenticeship systems (1963:148, 156). There are over 600 municipal vocational training schools, which give both practical and theoretical training. The pupils then go into industry, but for a further year they are considered as trainees, before they qualify for the full adult wage. In recent years many industrial enterprises have gone into partnership with the vocational schools. If a firm wishes to start a school for apprentices but cannot provide the theoretical part of the training, it arranges with a vocational school to do this --a practice called the "built-in school." The firm gives practical instruction for 34 hours a week and the school the theoretical part for 8 hours. The apprentices are formally under the supervision of a headmaster of a school throughout the whole week. At present, out of 140,000 pupils registered in the municipal vocational schools, only 40,000 are full-time; the remainder are in "built-in schools."

From "Apprenticeship" to "Training" for Skilled Workers

The concept of apprenticeship as a method of inducting young persons into the production system grew up in a pre-industrial age. A boy was indentured to a master for a period of years and learned a craft by helping the master and the journeymen. Under modern conditions, the traditional form of apprenticeship is much less appropriate. It is being replaced by the concept of training, which connotes the use of specialized instructors and a carefully planned program, often combining formal kinds of instruction with supervised work experience. Furthermore, the concept of "apprenticeship" is more likely to suggest a need for learning the traditional lore of a craft, while "training" should suggest instruction based on analysis of actual jobs to be done.

Newly developing countries will be well-advised to seek solutions to their problems of producing skilled workers by thinking in the broader, more flexible, and more modern terms of a "training system" rather than in the more confining and traditional terms of an "apprenticeship system." The reasons are of several kinds.

1. The nature of the jobs in a modern production system

Only a small and declining proportion of the jobs in a modern production system are capable of being defined along traditional craft lines. One-job skills, not craftsmanship in the old sense of all-round competence, are required of the major proportion of the labor force. By proper methods, these skills can be taught rather quickly to intelligent persons, especially if the trainees have a reasonably good background of general and pre-occupational education (that is, are "trainable" in the sense described earlier). At the higher skill levels, the increasing demand is for the sub-professional technician's proficiency, which requires more abstract, theoretical understanding than is usually associated with apprenticeship.[1/]

2. The rapidity of change in skill requirements

Constant technological and economic change is characteristic of a modern production system. This makes inappropriate a traditional feature of apprenticeship, namely, a long, fixed period early in the working career in which the young entrant learns a collection of skills presumed to qualify him in a certain trade for a lifetime. Nowadays trades do not remain fixed in content. New ones rise, old ones disappear. The appropriate response is more general education and broad pre-occupational education, shorter initial training in specific job skills, and repeated opportunities for further training and further education throughout the working career.

3. Inefficiencies and inequities to which apprenticeship is prone

A common form of apprenticeship obligates the learner to serve his employer for a fixed period of years with low compensation, if any, and the employer in return is supposed to teach the young worker his trade. If the employer is conscientious and either himself or through his workmen provides good examples and good teaching, skills can be imparted in this manner at low cost. Very often, however, especially in the conditions of newly industrializing countries, the young workers are exploited as a source of cheap labor and instruction is minimal. If there is instruction, it is likely to be given unsystematically by persons who, even if they are good workmen, may have little skill in teaching.

Of course, where an extensive apprenticeship system is already well established, the most feasible way to make progress may be to

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[1/] See on some of these points Liepman, 1960:21

"modernize" it. This has been the approach of some of the Latin American organizations described in Chapter 4, most of which have "apprenticeship" in their names. To this end there should be regulation and supervision of the apprenticeship contract, some means of verifying that instruction is actually given on the job, assistance in planning a training program and in improving the teaching qualifications of those who will execute it, provision for classroom-type instruction in the more theoretical aspects of the training, and provision for associated further education.

If a modernized apprenticeship program turns out to be substantially the same as what we have been calling a training program, there is no need to quibble about words. However, there are many modern skills to which apprenticeship is not now being applied and can hardly be applied. Furthermore, the need for instruction does not end with the period of youthful initiation into employment normally covered by apprenticeship. On the whole, newly developing countries will be more likely to find good solutions if they abandon the habits of thought associated with the term apprenticeship and adopt instead the more inclusive and flexible concept of training.

The Role of Vocational Secondary Schools

There is a widespread tendency in newly industrializing countries to act on the assumption that the way to produce skilled workers is to set up vocational secondary schools and give as full a training as possible before employment. This tendency has lately come under strong criticism. For example, a paper by Philip J. Foster is significantly entitled: "The Vocational School Fallacy in Development Planning." (Anderson and Bowman 1965:142-166.) While written with special reference to Ghana and neighboring areas in West Africa, the conclusions are widely applicable in other regions. One of Foster's principal theses is that,

> ". . . a great deal of training must be developed outside the schools through the use of auxiliary institutions, with special vocational institutes being created in particular cases where their endeavors can be closely meshed with on-the-job training and with the actual manpower requirements indicated by the market for skills."

Various kinds of vocational training can be inaugurated,

> ". . . without, at the same time, forcing vocational education into the formal school structure or providing massive developments in the form of specific technical and vocational schools for full-time pupils. To be sure, such institutions must play a role in development but their number should be expanded carefully;

> they should be associated closely with actual developments in the economy through the provision of 'sandwich' and short courses, and their clientele should be largely individuals who are actually employed. So far as possible, the burdens of vocational training should be shifted to those groups who are actually demanding skilled labor of various types . . .
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> ". . . Given more limited objectives the schools can make a significant contribution to development of technical competence by turning out pupils able to absorb and utilize effectively specific forms of vocational training."

One important consideration in appraising the role of vocational schools is their very high cost. Vocational schools are several times more costly per pupil than schools devoted to general education, largely because of equipment expense and the smaller pupil-teacher ratio necessary in shop courses. When account is taken of dropouts and of those who do not enter occupations for which they were trained, the cost per trained person finally made available to the employment system can be very high indeed.

Unfortunately, the only data at hand bearing on costs and benefits of vocational secondary schools come from highly industrialized countries.

In Switzerland it has been calculated that, in addition to the cost of buildings and equipment, the running expenses of full-time training in vocational schools are five times as much as training on the job. (Williams 1963:75-76.)

The Royal Netherlands Steel Works finds that apprentices it accepts from grammar schools, where they have had no preliminary technical training, take no more than three months to reach the same technical level as those from the technical schools (where children go at about age 12 after finishing primary education). (Williams 1963:75-76.)

A study in Worcester, Massachusetts, U.S.A., compared two groups of workers, the first graduates of a general high school, the second graduates of a vocational high school. Shortly after employment, the wages of the vocational school graduates were about 5 per cent higher than those of the general graduates. Five years later, wages of the general graduates had moved up just as well as those of the vocational graduates. However, the public costs of schooling for the male vocational group had been 2.3 times the costs of schooling for the general school graduates. Might it not be better, the author asks, instead of spending so much on vocational schools, to use equivalent funds to subsidize on-the-job training? (Corazzini 1966:38, 53-56, 112-113, 116.)

In the approach recommended in this paper, the functions of the vocational secondary schools would be divided between general, comprehensive secondary schools on the one hand and a new type of institution on the other. This new type of institution would operate in close cooperation with industry as an integral part of a combined system of training and further education, mainly for employed workers, and mainly financed by industry through an OTO or otherwise. It would serve: (1) youths in their first regular employment or with "sponsorship" of a potential employer, mostly on a part-time basis which would alternate instruction on the job with school instruction; and (2) adult workers, on a similar time-sharing basis, for upgrading, renewal, and transfer training and further education. School and in-plant training would be complementary, not substitutes for each other.

It may well be that in countries at an early stage of industrialization the training which can be provided on the job is low in quality, or entirely unavailable for certain kinds of skills that need to be introduced. Also, there are some outstanding examples in newly industrializing countries of well-run vocational schools which have no trouble placing their graduates, and in the circumstances they may well be worth their cost. There is a strong case for pluralism and experimentation, not limiting the choice of methods exclusively to any one approach. But the problem of how best to organize such training is so important --both in terms of the financial costs involved and the urgency of producing skilled workers-- that these issues deserve more than casual attention.

Meanwhile, where there is already a considerable investment in secondary vocational schools, the most promising avenues for development are likely to be the following three: (1) Affiliate some of the schools closely with industry, and use the equipment and instructors for those portions of a combined training and further-education program best carried on in an institution; in other words, create the new kind of institution mentioned two paragraphs earlier. (2) Convert some vocational schools into comprehensive secondary schools, using their equipment and instructors to constitute the industrial arts department of the comprehensive school. (3) Upgrade some vocational schools from the secondary to the post-secondary level and use them for technician training. There is a stronger case for institutional training of a specialized type at this level.

Professionals and Subprofessionals:

Occupations classified as professional --such as those of the chemical engineer, the architect, the industrial economist, the research scientist, or the university professor-- have the common characteristic that they require relatively broad knowledge, mastery of a complex subject matter, and ability to manipulate and apply rather abstract ideas and principles. Therefore, professionals require a good general education, well into or through the university level, followed by pre-occupational education which gives them thorough familiarity with the basic theoretical structures and operational skills related to the field in which they plan to specialize.

For subprofessionals -- such as draftsmen, surveyors, electrical technicians, statistical assistants, and library assistants-- the preparation required is neither so broad nor so deep. But the subprofessional does require a fairly high level of theoretical understanding, together with operational skills that often include a considerable mechanical element. The desirable general educational level is at least upper secondary, topped off or followed by pre-occupational education which provides a systematic background of theory and practical skills related to the chosen specialty.

A higher proportion of the total education and training of professionals and subprofessionals is appropriately carried on in institutions (as contrasted with on-the-job) than in the case of skilled workmen. This is because of the larger element of theoretical understanding best acquired in classroom and laboratory. Nevertheless, it is important that engineering schools, polytechnics, and other institutions preparing professionals or subprofessionals should develop close linkages with industry. Especially towards the end of their courses, students should be given practical problems to solve, as nearly as possible like those they will confront later in their jobs. Where feasible, interneships and part-time employment should be arranged. Professors should be encouraged to do a reasonable amount of consulting work in their special fields, so as to keep in close touch with the needs of industry, to bring realistic problems to their students, and to be in a better position to help their students with occupational counseling and in locating suitable jobs.

The employing organization which hires a new professional or subprofessional should by no means neglect its responsibility for a well-planned period of job-entry training. No matter how good the professional preparation of the recruit, he and the organization he works for will benefit from a thoughtful program to acquaint him systematically with the particular aims, problems, and working methods of the group that he has joined.

Finally, throughout their working careers professionals and subprofessionals need repeated opportunities for refresher courses, attendance at professional conferences and seminars, and other means of advancing their competence and keeping it up to date. Here is a field in which the opportunities for close cooperation between universities and other institutions for professional or subprofessional education on the one hand and the employment system on the other should be vigorously pursued.

The late Homi J. Bhabha, when head of the Atomic Energy Department of the Government of India, developed a system of in-employment training for scientists and technologists which illustrates what a large employing organization under imaginative leadership can do. The Atomic Energy Department recruited from universities all over India, endeavoring to choose the most promising, well-prepared people. They put the recruits into a one-year training course at their own special school and then into on-the-job training. The trainees worked in groups with more experienced people, and after about three or four years they were useful scientists and technologists who could be relied on. The staff of some five thousand in the Atomic Energy establishment, said Bhabha in an interview, was not obtained by pilfering from other departments or the universities. "We recruit only about 300 persons per year, while there are many hundreds of others whom the departments can recruit and give similar training. So we're not depleting, so to speak, the reservoir of trained scientific manpower." (Bhabha 1963.)

CAREER-LONG EDUCATION AND TRAINING

In view of the rapid changes in occupational roles which must occur as the process of modernization goes forward and the continual technological and other changes which are characteristic of a modernized economy and society, is it really useful to proceed in educational planning as though at some fixed point formal education terminates and "life" and "work" take over, accompanied only by informal, unplanned learning? Would it not be better in the newly developing countries (and the highly developed ones also) consciously to plan educational and training systems so that formal learning opportunities recur throughout a person's working career?

This is the reason for urging that educational theorists, planners, and policy-makers cease to neglect the "second educational system," --or, more accurately, the system of training, retraining, and further education which is concerned with men and women already active in occupations or at the point of entry and with adults generally. This second educational system has already grown to quite large dimensions in some of the highly developed countries. In the United States there are estimates (quite speculative, for there are no good data, the attention of educational statisticians having been concentrated on the regular educational system) which would place the total expenditures of U.S. business and industry or in-service training and education at about half as much as the total expenditures of the regular school system. (Source citations to be supplied.)

In terms of occupational education and training, the job-entry period and the initial years of a person's employment are particularly significant. Work experience intermixed with specific job training and further education are needed. But training and further education should not terminate at the end of the initial employment stage. Repeatedly there should be new opportunities to upgrade the person's level of competence, to renew his knowledge and skills so as to keep him abreast of changes in his field, and to assist in transfer to other fields when that proves desirable.

A corollary is that school leaving might become a gradual process. At one of several points --which one depending on how much initial education the country and the individual can afford and on aptitudes and interests-- young persons would begin to work part-time at various trades, professions, and other productive occupations while also engaging part-time in further education and training. The entry into paid employment would be in graduated steps, and opportunities for repeated exposure to formal learning processes would continue through life.[1]

This would provide for a better splicing between school and employment and for a better allocation of educational and training responsibilities, looking to the schools for the educational tasks that they can perform best and to the employment system for the training and work-experience contribution that it is best equipped to make.

The concept of career-long education and training as a formally planned feature of an environment where knowledge and occupational requirements are ever-changing is still somewhat unconventional, but thought is moving in this direction. It may be necessary to re-examine traditional practices with respect to educational degrees and training certificates. In a world of such rapid change, should these be issued for a lifetime? Or should they carry expiry dates, like certain medicines or an automobile driver's license? More feasible, no doubt, might be a gentler break with the past in which the degrees and certificates would not formally expire, but dated supplements would be offered, to be obtained by demonstrating updated knowledge and skills. Thus, one might see diplomas like: "Ph.D., Chemical Engineering, 1950" or "Master electrician, 1955" with gold stars marking "Updated 1963," or "Renewed 1967."

An interesting experiment in an Asian country proposes to develop three types of "career streams" taking off from three different levels of formal schooling. The scheme is aided by the Center for Management and Industrial Development, Rotterdam, Yap Ki Han, Director, and by the SAIFFEE Foundation. The first career stream links with primary education and provides in-plant apprenticeship to the age of about eighteen to twenty years, after which the persons may qualify as skilled workers. At the age of twenty-five to thirty, further training and technical upgrading takes place to develop these persons either into first-line supervisors or into master craftsmen qualified to operate their own workshops. The second career pattern takes off from secondary education and aims at developing qualified technicians who later, after a two-year "junior entrepreneurial training course" will be encouraged to establish and operate their own mostly small-scale undertakings. The third pattern joins with the college and university level of education and provides training for senior engineering and middle management functions and ultimately for senior leadership posts in medium-sized and larger companies. The three career streams are to be linked at appropriate phases, to provide the flexibility required by the industrial scene and also by changes in the individuals. (Yap 1966:11-12.)

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[1] Suggestions along this line were made by Clarence Faust a few years ago. (David 1960:44-46.)

Training Linked to Projects: Extension Services

Occupational education and training programs are important in fostering all types of development --in agriculture, industry, commerce, the political system, health services, and other activities. Other elements, such as investments in irrigation works and fertilizers, industrial plants and equipment, or hospitals will be less productive, even wasteful, if education and training aspects are overlooked. The same applies in reverse. Education and training programs will be fully effective and yield appropriate returns on the large investment which has to be made in them only in combination with other appropriate policies and investments. Therefore, training programs and further education should be closely linked to projects and to current or foreseeable needs in the various development sectors (agriculture, industry, health, etc.).

We are dealing here with a very important general principle of development.* The process of development is always one which brings together combinations of factors that mutually reinforce each other in appropriate ways. The interaction among properly selected factors will usually prove more rewarding than any single-factor approach. Experiments in agriculture illustrate the point. For example, experiments with corn (maize) in northwest India showed that yields of about 25 bushels to the acre could be expected using traditional practices. Introduction of improved seed (an adapted hybrid) raised the yield, but only to about 28 bushels. Keeping the local seed, but introducing proper water control and adding fertilizer, the local variety could be brought to produce about 28 bushels. But by combining the higher genetic potential of the hybrid seed with proper water control and fertilizer the yield jumped to around 100 bushels. Improvements added one at a time hardly had enough effect to justify their costs, but a suitable combination of factors gave a remarkable increase which gave ample returns on the investment.

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* I have expanded on this theme in a recent paper (Staley 1966) and earlier applied it to small industry development policy (Staley and Morse 1965:352-355).

In a trenchant little book entitled Getting Agriculture Moving (1965), A. T. Mosher stresses five "essentials". The absence of any one of these will block agricultural improvement. He then discusses five "accelerators". Their absence may not entirely prevent agricultural progress, but progress will be significantly faster if they are present. Education is one of the accelerators.

Does the principle that specific occupational training should be provided near or at the point of entry into employment and repeatedly during employment apply to agriculture? I believe that it does, and that there are weighty reasons for including in the primary and secondary school curriculum, even in rural areas, only "pre-occupational" aspects of agriculture, closely allied with general education. Specific training in agricultural methods would then be provided at the professional and subprofessional levels in specialized institutions for the preparation of technicians and agricultural advisers, while the in-service training and retraining of practical farmers, including the upcoming generation, would be promoted through the agricultural extension service. There are some extremely important and difficult questions in this problem area which need careful study and clarification, however. In view of the fact that most of the people in newly developing countries still live in rural areas and are engaged in some form of agriculture, more research and experimentation bearing on problems of occupational preparation for agriculture and the general content of education which is appropriate in rural areas is much to be desired.

In the field of industrial development, training programs should always be planned as part of any large project, along with plans for buildings and equipment, finance, and marketing. Provision for training of management personnel is particularly important. Where projects involve agreements with foreign firms or international assistance agencies, the agreement should provide for cooperation in the training of local managers and submanagers and other types of skilled personnel.

Industrial extension services (which go under such names as productivity centers, industrial development centers, small industry service institutes, and so on), like their analogs in agriculture, have the great virtue of training or retraining persons already committed to and knowledgeable about their jobs. What is learned is likely to produce immediate results in higher output. In-service education and training techniques for key personnel in industry include seminars, conferences, demonstrations, visits abroad, and special courses.

In newly developing countries, modernization and growth of indigenous small industry needs to be encouraged, as a source of local entrepreneurial and managerial talent, as a means of "filling the cracks" between the larger industrial units, and as a means of expanding employment and output. Training of the extension-service type, particularly designed to develop entrepreneurship and managerial ability, is required in combination with a suitably selected array of other developmental measures. Efforts to promote small industry by loan programs alone often fail because they are inadequately supported with education and training programs, financial counseling, technical advice, and market analysis. (Staley and Morse 1965:especially Part 4.)

High Priority for Education and Training of Working Adults

One of the gravest errors in the planning of education and training programs in nearly all countries is underinvestment in education and training for adults. This applies to a wide range of educational activities, including general education (not merely literacy, which should be a means rather than an end), agricultural improvement through education and extension work, and education for community development and citizenship. It applies emphatically to the problem of meeting the qualified personnel needs evoked by industrialization.

W. Arthur Lewis has put succinctly a truth that could usefully be framed on the wall of every planning office concerned with educational aspects of development: "Education for children is fine, but its potential contribution to output over ten years is small compared to the potential contribution of efforts devoted to improving adult skills . . . . The quickest way to increase productivity in the less-developed countries is to train the adults who are already on the job." (Lewis 1961:121.)

V. K. R. V. Rao, economist and member of India's Planning Commission, writes of his country that "unfortunately, adult education programs have not received priority in our educational policy . . . Education at the adult level is absolutely essential from the point of view of economic development . . . ." (Rao 1964:8-9.) From a highly industrialized country, the United States, there is testimony that "many vocational educators feel that evening and part-time courses for employed workers are the most effective part of the trade and industrial program . . . . Almost all evening and part-time courses are now devoted to extending the skills of employed workers." (David 1960:164.)

A weighty argument for high priority to education and training for working adults is the immediacy of the return. This is a very important advantage in countries where the problem is to get economic growth started and thus to generate the added production and income which will make it possible to achieve other educational goals.

To put the matter in more technical economic terms, in countries where capital for investment is scarce and interest rates high, the "discount on futurity" is also high; income this year is worth considerably more than the same amount of income several years hence. Suppose the same educational resources devoted to a ten-year-old and to a twenty-year-old would produce in the first case an increase in the national product of one unit per year ten years from now and in the second case one unit per year starting this year. At a ten percent annual compound interest rate (a conservative estimate in the conditions of newly developing countries) the unit produced this year is worth 2.6 times as much as the unit to be available only ten years from now. Or, looked at the other way round, the present value of one unit to be received ten years from now is only 0.38 units.

There are many other strong arguments for high priority to adult education and training. P. G. H. Hopkins in a noteworthy paper on "The Role of Adult Education in Economic Development" for the Nyasaland (now Malawi) Economic Symposium in 1962 (Jackson 1965:51-70) presented eight:

- Even the best childhood education will be inadequate for a lifetime spent in the modern, rapidly changing technical world.

- Adult education is needed to remedy the weaknesses of past and present school systems.

- Adult education is needed so as not to lose what benefits schooling provides and so as to create an atmosphere of respect for education which will encourage children to pursue their studies with keener interest.

- The flexibility of informal adult education in contrast to the rigidity of most school systems offers greater potential for a break with cramping traditions and for large-scale experiments.

- Many important issues require from the students a wide experience of life and are better dealt with by adult minds and adult study-methods.

- If the modernizing influence of education reaches only the new generation, the tensions between children and parents will become even greater; adult education is necessary to help bridge the gap between traditional elders and adventurous youth.

- The returns on educational investment in adults can be substantial.

- From the viewpoint of efficient use of educational resources, adult education has good claims for priority.

This last point deserves special emphasis. Quoting Mr. Hopkins:

> "School education is usually compulsory, either by law or by parental order; adult education is voluntary -- and 'a willing horse can drag a heavy load'. Holger Begtrup, the principal of a Danish Folk High School, concluded after many years of experience: 'The same amount of information which it takes a half-grown youth dozing on the school benches three to five years to learn, can be acquired in the space of three to five months by adults who are keen on learning and who have done practical work.' Many experiments in informal education have corroborated the essence (if not the mathematics) of this . . . .
>
> "What entrepreneur could afford to ignore Begtrup's estimate of a cutting to one-twelth of his production time? How can emergent governments afford to neglect the time-saving and cost-reducing nature of adult education?"

Adult education deserves more attention not only because of the skills and knowledge it can impart but, perhaps even more crucial for development, because of the considerable potential it has (at least in some circumstances) to influence attitudes, values, motivations, and habits of thought and work. As noted, in Chapter 2, there is some impressive experience on this point, certainly enough to justify more investigation and experimentation.

Priorities in education and training for adults should probably go to working adults and to comparatively young adults (say ages 20 - 35). Results achieved with working adults are reflected immediately in productivity and begin at once to increase the income stream which makes possible higher consumption levels and more investment in education and other developmental activities. Comparatively young adults are probably on the average more receptive to new ideas and learn more quickly. They have more years remaining in their working lifetime during which any productive effects of their education and training can yield returns to society.

All in all, it seems highly probable that investment in the training and further education of persons already committed to an occupation and having substantial experience on which to base further learning would yield higher developmental returns in most newly modernizing countries than equivalent investment in uncommitted and inexperienced persons. (The evidence is scattered and unstudied -- only suggestive, not conclusive. This is a field in which investigations are needed.) Planners of occupational education and training to meet the needs of development should, at the very least, pay much more attention to building up and using the "second educational system." There may even turn out to be a case, when the question has been more thoroughly investigated, for making the second educational system as important in development plans and in fund allocations as the regular one!

Appendix A

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Appendix B

FOR WORKSHOP DISCUSSION

Participants are asked to test and challenge all propositions in this essay. As stated in the Preface, each assertion and policy proposal, though put forward in a positive form, is meant as an hypothesis, not a firm conclusion. The purpose is to raise issues for discussion.

Some Questions

Among questions which the essay raises directly or by implication and which will probably be discussed in the Workshop, a few may be listed as follows:

1. What should be the respective roles of general and occupationally-oriented education in educational plans to support economic-social-political development?

2. How can we best determine the types of skills, knowledge, and personality traits needed in different occupational roles and in different lines of activity? How can the results best be taken into account in designing curriculum content, syllabuses, and methods of instruction?

3. What tasks of occupational education and training are best performed as a part of regular schooling? In special vocational, technical, or professional schools prior to employment? By classroom or on-the-job instruction at the point of employment or after employment? By apprenticeship, internship, or similar devices? By conferences, conventions, demonstrations, advisory or extension services, correspondence courses, and other extra-school means?

4. What can be done to promote more and better training by employing organizations? What organizational devices and incentives may be appropriate? How will factors such as a country's level of development, types of economic and other activities, and political and administrative conditions affect the answers?

5. What methods are available for providing feedback to the education and training system about the actual needs of the employment system?

6. What about the issue of separate academic and vocational schools at the secondary level versus comprehensive or multichannel schools?

7. What methods are recommendable in different circumstances for financing occupational education and training?

8. What do we know (and where might we get more evidence) about the relative costs of the various types and methods of occupational education and training and about benefits in relation to costs?

Sectoral Applications

The analysis and the illustrations in the essay have a bias towards the problems of industry, reflecting the author's experience. In the Workshop it is hoped that we can examine the applicability or non-applicability of major propositions and proposals to other development sectors. As a checklist, the following major groups of activities requiring qualified personnel are repeated here (from Chapter 2):

Industry

Agriculture

Commerce

Government, politics, and law

Health

Education

Research

Social communication

Households

Frontiers for Research and Development

Participants are asked to list and to bring to the Workshop their ideas about the most worthwhile directions for future research and for pilot or demonstration projects, materials development, etc. in the general area of occupational education and training for development. Suggestions concerning the most promising locations for field investigations, including ongoing programs of more than local significance that should be studied, and of institutions and individuals who might enter into a cooperative effort, are also desired.